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Bibliography on Evaporation

0 November 1959 No. 11

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 45 Beacon Street, Boston 8, Mass.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract No. AF 19(604)-5989.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 10 NOVEMBER 1959 No. 11

INDUSTRY · ENGINEERING · AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH ·
AMERICAN METEOROLOGICAL SOCIETY
1919

SPECIAL FEATURE IN THIS ISSUE

Bibliography on Evaporation

By
Geza Thuronyi

(For complete table of contents see back cover)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 45 Beacon Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted by MAB is given in bold face type below.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

★**Acta Geophysica Polonica,** [Warsaw].
★**Acta Meteorologica Sinica,** [Peking].
★**Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.** and **Ser. Geofiz.,** [Moscow].
American Geophysical Union, Transactions, [Washington].
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
Annales de Géophysique, Central National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
★**Australian Journal of Physics,** [Melbourne]
★**Beiträge zur Physik der Atmosphäre,** [Frankfurt a. Main].
★**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
★**Geophysical Magazine,** Japan Meteorological Agency, [Tokyo].
Hemel en Dampkring, [The Hague].
★**Időjárás,** Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal de Mécanique et de Physique de l'Atmosphère,** Société Météorologique de France.
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorologické Zprávy** [Prague].
★**Meteorological Society of Japan, Journal,** [Tokyo].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologiia i Gidrologiia,** [Leningrad].
★**Meteorologische Rundschau,** [Berlin].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
Polarforschung, Archiv für Polarforschung, [Kiel].
★**Przegląd Geofizyczny,** [Warsaw].
Revista de Geofísica, Instituto Nacional de Geofisica, [Madrid].
★**Rivista di Meteorologia Aeronautica,** Servizio Meteorologico, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**South Africa, Weather Bureau, Notos,** [Pretoria].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** American Meteorological Society, [Boston].
★**Wetter und Leben, Österreichische Gesellschaft für Meteorologie,** [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ›ring to the attention of meteorologists current literature in their field.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a pecial subject (usually arranged chronologically).

Bibliographies published in the successive issues were:

Vol. I, 1950

. Atmos. Pollution 2. Aerobiology 3. Cloud Physics 4. Hail
. Tornadoes 6. Volcanic Dust 7. Climat. Changes 8. Thunderstorms
. Icing 10. Acoust. Propagation 11. Evaporation

Vol. II, 1951

. Extended Forecast. 2. Long Range Forecast. 3. Soil Temp. 4. Constants, etc.
. Clim. of Near East 6. Clim. of Middle East 7. Special Winds 8. Radar Storm
. Condensation Trails 10. Clim. of N. E. Africa 11. Mountain Met. Detect.

Vol. III, 1952

. Clim. of N. W. Africa 2. Carbon Dioxide 3. Clim. of Argentina, etc. 4. Dew
. Objective Forecast. 6. Stratus Forecast. 7. Urban Climatology 8. Clim. of C. Africa
. Visibility 10. Glaze and Rime 11. Free Air Turbulence

Vol. IV, 1953

. Turbulence Theory 2. Turbulent Diffusion 3. Frost 4. Clim. of Australia, etc.
. High Level Winds 6. Winds in Stratosphere 7. Jet Stream 8. Radiation Bioclim.
. Clim. of Pacific 10. Auroras 11. Sferics

Vol. V. 1954

. Oceanog. Met. 2. Clim. of S. E. Asia 3. Auroral Physics 4. Tropopause
. Balloons 6. Numerical Forecast. 7. Radiation Data 8. Vertical Motion
. Clim. of Arctic 10. Industrial Met. 11. Wind Waves and Swell

Vol. VI, 1955

. Bibliog. of Bibliog. 2. Texts & Monogr. Bibliogs. 3. Storm Surges
. Ionospheric Prop. 5. Photochem.—Upper Atmos. 6. Cloud Physics
. Radar Cloud Physics 8–9. Atmos. Nuclei 10. Weather Modification 11. Cooling Power

Vol. VII, 1956

. Synoptic Met.-Arctic 2. Clim. of Enclosed Spaces 3. Cosmic Rays (–1952)
. Cosmic Rays (1953–56) 5. Atmos. Radioactivity 6. Inversions
. Snow Micromet. 8. Snow Micromet. (Suppl.) 9–11. Tropical Cyclones

Vol. VIII, 1957

. Solar Weather Relations 2. Night Airglow 3. Forecasting Special Elements
. Forest Micrometeorology 5. Hydromet. Forecasting 6. Numerical Forecast. (Suppl.)
. Albedo 8. Meteors 9–10. Tropospheric Prop. 11. Medical Meteorology

Vol. IX, 1958

. Radioastronomy 2. Solar Astrophysics 3. Radioactivity in Atmosphere
. Waves and Currents 5. Physical Oceanog. 6. Dynamic & Phys. Oceanog.
. Long Range Forecast. 8. Radar Met. 9. Cosmic Rays 10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks 2. Tornado Forecasting 3. Soil Moisture 4. Sferics
–6. Ozone 7. Acoustic Waves 8. Evaporation Measurement
9. Evapotranspiration (–1955) 10. Evapotranspiration (1956–1959) 11. Evaporation

Other bibliographies in preparation are:

Actinometers	*High Atmosphere Temperatures*	*Singularities*
Forecast Verification	*Micrometeorology*	*Synoptic Aerology*
Frost	*Radiation*	*Thunderstorms*

Part III contains a listing of reviews, translations, reprints, and the contents of important ublications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue ›mprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

See also: **Handbook of plant physiology, 10.11–33.**

10.11–1 551.5:656.6:06.045

World Meteorological Organization, **Meteorology as applied to the navigation of ships: lectures presented at the second session of the Commission for Maritime Meteorology, Oct. 1956.** Its (*Publication*) *WMO*, No. 76. TP. 30; Technical Note, No. 23, **1958.** 26 p. 9 figs. French, Russian and Spanish summaries preceding p. 1. Price: Sw. fr. 4. Contents: Frankcom, C. E. N., **Introduction to the problem of meteorological navigation,** p. 1–5. Rodewald, M., **Some aspects of meteorological navigation,** p. 7–16. Schule, J. J., **Weather routing of ships,** p. 17–23. Lieurance, Newton A., **Meteorological service for merchant shipping,** p. 25–26. **DWB.** Review in its *WMO Bulletin*, 8(1):42–43, Jan. **1959.**—FRANKCOM, former president of the Commission for Maritime Meteorology, outlines the problem of weather effects on shipping and aids to navigation and shipping by weather services. RODEWALD speaks of maritime navigation to allow for variations, as well as average conditions and classifies meteorological navigation according to 3 scales in time: 1) immediate weather probabilities, 2) broad or general weather probabilities for several days, and 3) climatic or average probability or expected long period weather conditions and the need for forecasts, both short and extended range. SCHULE describes system used by the U. S. Navy to apply meteorological and oceanographic forecasts to ship routing. Extended (5 day) weather forecasts and other information is used to predict waves which might slow up progress. LIEURANCE gives some general remarks on use of weather reports and forecasts by shipping companies, or ship masters, to reduce time and thus save money. *Subject Headings:* **1. WMO Maritime Meteorology Commission meetings 2. Meteorological navigation 3. Ship routing.**—*M.R.*

10.11–2 550.3:061.3 551.513:551.46:061.3

Leningrad. Gidrometeorologicheskiĭ Institut, **Materialy konferentsii po probleme "Vzaimodeĭstvie atmosfery i gidrosfery v severnoĭ chasti Atlanticheskogo Okeana," Vypusk 1.** [Papers of the Conference on the Problem of Interaction Between the Atmosphere and the Hydrosphere in the North Atlantic, Vol. 1.] Leningrad, Gidrometizdat, **1958.** 55 p. tables, figs., refs. All articles abstracted separately. On cover-page: Mezhdunarodnyĭ Geofizicheskiĭ God. **DWB**—This publication of the Leningrad Hydrometeorological Institute begins the publication of the material of the scientific conference on the Interaction of Atmosphere and Hydrosphere in the North Atlantic held in Leningrad in March 1958 in connection with the IGY program. The general plan of publication of the materials of the conference is as follows: Vol. 1—(a) General problems, (b) Study of atmospheric circulation; Vol. 2—Study of the relation between hydrologic conditions of the ocean and atmospheric circulation and solar activity; Vol. 3—Study of water circulation; Vol. 4—Study of ice drift; Vol. 5—Study of thermal processes. The contents of Vol. 1 include the following: a list of abbreviations of institutions, societies, etc.; news of the conference and its resolutions and the following papers: **Statement on investigations on the problems of the interaction of atmosphere and hydrosphere in the North Atlantic,** by V. V. Timonov; **Long period changes in the forms of atmospheric circulation and associated variations in sea level,** by A. A. Girs; **Attempt at classification of pressure fields over the North Atlantic for the computation of currents and ice drift,** by M. A. Valerianov and **Maps of wind fields for seas and oceans and the experimental verification of the methods of preparing them,** by A. I. Sozkina. P. 5–18 gives information

on the conference. During March 26–29, 1958 the first scientific conference on the IGY investigation of the Interaction of the Atmosphere and Hydrosphere in the North Atlantic was held in Leningrad under the auspices of the Leningrad Hydrometeorological Institute in agreement with the Oceanographic Commission of the Presidium of the Academy of Sciences of the U.S.S.R. and the working group in oceanography of the International Committee for the IGY. The conference aimed to evaluate the preliminary results of research on this problem carried out in 1956 and 1957 by the various research institutions. In addition to fifteen papers on this subject reports were presented on allied topics by members of institutions not participating in work on this problem. The reports presented at the conferences fell into the following classes: studies on atmospheric circulation, studies on oceanic circulation, ice drift, and thermal processes. The titles of the papers and the names of the authors are listed. The general resolutions and the resolutions on investigation of the atmospheric circulation, on oceanic circulation, on ice studies, on thermal processes, and on investigations carried out during expeditions are presented. *Subject Headings:* **1. IGY oceanography program 2. Atmospheric circulation 3. Ocean-atmosphere interaction conferences 4. North Atlantic.** —*I.L.D.*

10.11–3 551.573(08) 551.579.4(08)

International Union of Geodesy and Geophysics. Association of Scientific Hydrology, **Symposia Darcy, Dijon, Sept. 20–26, 1956: (Proceedings), Vol. 1, Evaporation.** Its *Publication*, No. 40, (1957?). 29 p. figs., tables, refs. Price: 100 frs belges. (For listing of contents, *see* Pt. III, p. 803, May 1959, *MAB*. All articles abstracted separately.) Also Vol. 2, **Eaux souterraines** [Underground waters]. Its *Publication*, No. 41, (1957?). 287 p. figs., tables, refs. (All articles abstracted separately.) Also: Vol. 3, **Crues** [Floods]. Its *Publication*, No. 42, (1957?). 418 p. Price: 300 frs belges. **DWB** (M79 161sym). (Articles of meteorological interest abstracted separately.) For listing of contents of Vol. II and III, *see* Pt. III, p. 1608, Oct. 1959, *MAB*. **DWB** (M79 I61sym)—Vol. I and II of the report of this symposium contain articles on the evaporation from the water surface of a reservoir, the application of research on evaporation in hydrology, evaporation index of the Alpine Mattmark basin, research on evaporation and evapotranspiration in the U. S., evaporation and evapotranspiration studies, U. S. Department of Agriculture in the Pacific Southwest and the methodology of evaporation in Germany. Vol. III discusses the following: flood control in Egypt, the unprecedented floods of October, 1955 in the Punjab, the variability of the maximum annual discharges, the forecasting of the flood height, the classification of the floods in central Europe and their forecasts, the method of determining the probable flood, the hydrodynamical study on the flood flow, some methodical problems of flood forecasting in drainage basins of great extension, the hydrologic studies of floods in the U. S., radar in flood hydrology, the meteorological study of the possibilities of floods, the crests of icy floods, a comparison of measured storm water runoff in an intermittent river (wade) near Jerusalem with computed water surplus based upon climatological data from Jerusalem, and many others. *Subject Headings:* **1. Symposia Darcy, Dijon, 1956 2. Evaporation symposia 3. Flood symposia.**—*N.N.*

TEXTBOOKS AND TECHNICAL BOOKS

10.11–4 551.5(02)

†Blumenstock, David Irving, **The ocean of air.** New Brunswick, New Jersey, Rutgers Univ. Press, 1959. 457 p. figs., charts, notes (incl. bibliographic refs.) p. 417–440. **DLC** (QC863.B55). Review by Robert Brittain in *Saturday Review*, 42(50):34–35, Dec. 12, 1959.—A new and long-awaited approach to instruction in practical meteorology is used in this text which Dr. BLUMENSTOCK has been a decade in preparing. It would be useful for general information, or for an introduction course at an agricultural, technical, military or teacher college. The outline is logical, the subjects are introduced with either an historical, literary or philosophical quotation or allusion, the annotations are both scholarly and personalized and the book is well indexed with respect to subjects, persons and places. Material throughout is up-to-date and valid through early 1959. The 3 major parts cover: Pt. I. Physical nature of atmosphere; Pt. II. Observation, prediction and control; and Pt. III. Application. In Pt. I—the usual elements: radiation, thermal patterns, winds in general, special winds, hydrologi

cycle, deserts and moist regions, water management and the upper atmosphere are covered in short, readable chapters. In Pt. II the modern methods of observation and of forecasting, climatic changes, and weather modification are treated in some detail. In Pt. III relations of atmosphere, weather and climate to human health and disease, to agriculture, industry, commerce, war, nuclear weapons and, finally, weather in history are treated on the basis of the author's extensive and varied experiences in all of these fields. No mathematics are included, and the graphical material is almost all original. *Subject Headings:* **1. General meteorology textbooks 2. Applied meteorology.**—*M.R.*

10.11–5 551.584.1:63(02)

†Brooks, Frederick A., **An introduction to physical microclimatology, Chapters IV, V, VI, and VII.** Davis, California, Univ. of California, **1959.** p. 93–264. figs., tables, 188 refs., eqs. (For abstract on Ch. 1–3, *see* 10.1–13, Jan. 1959, *MAB.*) **DWB** (M84.B873in)—Continuing the presentation of material for a textbook on micrometeorology from an agricultural engineering standpoint (Ch. I, II and III dealt with climate and weather, solar and terrestrial radiation, and conduction of heat in ground, respectively), the author takes up, in Ch. IV, eddy transfer and thermal convection (surface drag in orchards, windbreaks, clearings. heat, plumes, eddy diffusion, gustiness, convective transfer to fruit and leaves); V. evaporation and transpiration from moist and bare surfaces, potential evapotranspiration, evaporation, cooling, sun drying, fire hazard, lysimeters; VI. frost protection in orchards, cold air sources and flow, windbreaks for frost protection, heat balance of an orchard, protection by use of covers and water, by heaters and wind machines; VII. local climates and climatic maps—influence of topography, local difference in solar radiation, summer temperatures, wind maxima, precipitation differences in local climates, daily soil temperature, climatic limits for fruits and ornamental shrubs in California, micro-weather recording stations, weather cycles and types, diurnal cycles in cattle protection by shade, climatic maps for U. S., etc. A quantity of practical data is included in charts, tables, maps, schematic diagrams, nomograms, formulas, conversion factors, etc. References are given by chapters, with emphasis mainly on U. S. and especially on California conditions. *Subject Headings:* **1. Microclimatology textbooks 2. Agricultural climatology 3. Eddy transfer 4. Evaporation 5. Frost protection 6. Local climatology 7. California 8. United States.**—*M.R.*

10.11–6 551.5(02)

†Day, John A. and Decker, Fred W., **Rudiments of weather: the story of our energetic atmosphere.** 2d ed. Corvallis, Oregon, Oregon State College, Cooperative Association, **1958.** 97 p. figs., forms., refs., p. 92–93. Looseleaf. (For abstract on first edition, 1955, *see* 9.7–11, July 1958, *MAB.*) **DLC** (QC863.D28 1958), **DWB** (M D274r)—Elementary principles of weather are covered in 13 chapters dealing with importance of weather signs, observing and reporting, radiation, energy, convection, water, latent energy release, cyclones, general circulation, precip., upper atmosphere and climate. The chapter on observing has numerous illustrations of standard and specialized equipment and instruments. Other chapters have numerous schematic diagrams, charts, maps, etc. Data on weather extremes, recommended reading, radio broadcasts and an index are appended. *Subject Heading:* **1. Elementary meteorology textbooks.**—*M.R.*

10.11–7 551.5(02):91

Miller, Arthur Austin and Parry, M., **Everyday meteorology.** N. Y., Philosophical Library, **1959.** 270 p. 77 figs., 22 plates, 17 refs. **DLC** (QC863.M49 1959). Review by S. R. Eyre in *Geographical Review*, 125(1):119–120, March **1959.** Review by J. S. Turner in *Science Progress*, London, 47(186):345–346, April **1959.**—An elementary descriptive meteorology textbook for teachers or students of geography or other students who do not want a mathematical or quantitative but a graphical approach: 1) observations, instruments, amateur or school weather stations; 2) collecting and plotting meteorological observations and issuing or broadcasting information and forecasts (especially in the U. K.); 3) causes of weather (radiation, heat and moisture balance, evaporation, condensation); 4) air mass properties, turbulence, convection, stability, fog, electricity; 5) air mass types and their properties (with illustrated synoptic charts and frequencies over British Isles); 6) fronts and frontal zones,

frontal waves and patterns; 7) circulation, cyclones and jet stream, tornadoes, hurricanes, general circulation; 8) world weather types by "natural" climatic regions (based on air mass types); 9) local weather (soil, orography, snow cover, vegetation, micrometeorology, marine effects, föhn's, valley winds, rain shadow, urban weather, atmospheric pollution); 10) forecasting and analysis problems (surface and upper air, single station); 11) weather hazards (floods, lightning, icing, snow, avalanches, fog, smog, wartime applications, rain making, hail shooting) and 12) useful aspects of weather (water, wind, sun). Appended are codes, conversion tables and nomograms, a brief list of references and a good subject index. A lot of original thinking has gone into this new text, and the line or schematic drawings, vivid photographs of weather events or consequences thereof and synoptic charts and sounding diagrams profusely scattered through the book add to the value. *Subject Headings:* **1. Meteorology textbooks 2. Synoptic case history studies, British Isles 3. British Isles.**—*M.R.*

10.11–8 551.5:63(02)

*†Molga, Marian, **Meteorologia rolnicza.** [Agricultural meteorology.] Leśne, Warsaw, Państwowe Wydawnictwo Rolnicze, **1958.** 572 p. 244 figs., 132 tables, bibliog. p. 560–565, eqs.—The second part of this work, which numbers nearly 600 pages, includes a well developed outline of agrometeorology. Several biological questions being broached, this work constitutes one of the infrequent textbooks which deals with the various agrometeorological problems in a logical and appropriate manner. The 8 chapters include: 1) Meteorological conditions of the layer of air close to the ground, 2) Climate of soil, 3) Information on ecoclimate, 4) Influence of meteorological elements on organisms of plants, 5) Phenology, 6) Improvement of plant community conditions, 7) Agrometeorological service and 8) Working methods in agrometeorology. *Subject Heading:* **1. Agricultural meteorology textbooks.**—*A.V.*

10.11–9 551.513:551.557.5(02):016

*†Pogosian, Khoren Petrovich, **Obshchaia tsirkuliatsiia atmosfery.** [General circulation of the atmosphere.] Leningrad, Gidrometoizdat, **1959.** 259 p. 100 figs., 31 tables+3 tables in appendix, 164 refs., eqs. **DWB** (M13 P746ob), **DLC** (QC880.P6)—A small textbook-like monograph on synoptic and aerological aspects of the general circulation for scientists, students and engineers working in the hydrometeorological service and covering, in 6 chapters, the following aspects: 1) thermal inhomogeneity of the atmosphere (vertical, horizontal, tropospheric and lower stratospheric temperature fields); 2) influence of continents and oceans on tropospheric temperature fields in different seasons; 3) thermobaric fields in the troposphere and cyclonic activity; 4) jet streams, their structure, relation to upper frontal zones, and frequency; 5) characteristics of Arctic and Antarctic circulation; 6) trade and monsoon circulation, N. and S. Hemisphere. Numerous space and time cross sections, thickness and other upper level charts and diagrams, data, frequency and schematic diagrams and other illustrative material are interspersed throughout the book to give practical value to the text. The chapter on the jet stream is a thorough exposition of the subject, based to some extent on the *WMO Technical Note*, No. 19 (*see* 10.2–17, Feb. 1959, *MAB*), on the jet stream, although most of the comments and a number of tables and cross sections for Eastern Europe or Asia are taken from original works of the author or his colleagues in the Soviet or Chinese services (97 out of 16 references are to Soviet literature). The main part of the discussion and charts are concerned with the Northern Hemisphere, although some of the recent Antarctic (IGY) analyses are included in Ch. 5. *Subject Headings:* **1. General circulation textbooks 2. Jet stream 3. General circulation bibliographies.**—*M.R.*

10.11–10 551.591(02):629.1

Gavrilov, Valentin Aleksandrovich, **Prozrachnost' atmosfery i vidimost'.** [Transparency of the atmosphere and visibility.] 2d ed. Leningrad, Gidrometoizdat, **1958.** 166 p. 4 figs., 16 tables, eqs. **DWB** (M91 G283pr), **DLC** (QC976.T7.G3)—A substantial pamphlet (8000 copies) for wide use, not only among meteorologists, fliers and mariners, but for the general public interested in technical subjects such as this. The fact that the radiation intensity received from a nuclear explosion at 6 to 30 mi is highly dependent on visibility (graph shows 10 times as much radiation at 6 mi if visibility is unlimited as it would be with 1.5 mi visibility) is given as a vivid example of the practical use of observations, knowledge an

forecasting of visibility. The separate chapters deal with: 1) contrast threshold and its relation to visibility; 2) physiological aspects; 3) causes of reduced visibility (haze, transparency, meteorological visibility); 4) visual range of actual objects under various meteorological, astronomical and conditions of objects themselves; 5) visibility of lights; 6) meteorological visibility of landing fields (runways). The text contains considerable data, illustrations of instruments and schematic illustrations of principles. *Subject Headings:* **1. Visibility textbooks 2. Atmospheric transparency 3. Aeronautical meteorology.**—*M.R.*

10.11–11 551.521.64(02)

†Galbraith, William, **Extensive air showers.** London, Butterworths Scientific Publication, **1958.** 211 p. 54 figs., 2 plates, 234 refs., eqs. Price: 21 sh. **DLC** (QC485.G3). Review by R. M. Tennant in *Nature*, London, 183(4675):1555, June 6, **1959.** Review by E. H. S. Burhop in *Science Progress*, London, 47(187):591, July **1959.**—The various aspects of high-energy incoming cosmic radiation particles which result in extensive air showers in the lower 20 km of the earth's atmosphere, as revealed by research during the past 20 years (since 1938), are treated systematically and thoroughly in this textbook for college physics students or workers in this field, or graduates in other fields. References to literary publications through 1957 are included. Successive chapters cover: 1) development of air showers; 2) lateral density distribution of electrons; 3) penetrating particles (m Mesons and N-component); 4) density spectrum; 5) longitudinal development; 6) underground experiments; 7) time variations and theories of origin of cosmic radiation (solar, galactic and extra-galactic) and 8) Čerenkov radiation. Appended are formulas and physical constants, functions, statistical analysis and use of scintillation counters in air shower experiments, a list of references and an author and subject index. Great emphasis is placed on experimental results and numerous data tables and curves are given for both sea level and high altitude observations. Photographs and diagrams show equipment and records. The chapter on Čerenkov radiation (p. 181–191) discusses results of observations and experiments on night sky radiation. Theory is not neglected in any of the chapters. *Subject Headings:* **1. Air showers 2. Cosmic ray textbooks 3. Čerenkov radiation.**—*M.R.*

10.11–12 551.79:551.583.3(02)(7)

†*Flint, Richard Foster (*Yale Univ.*), **Glacial and Pleistocene geology.** N. Y., John Wiley, **1957.** 553 p. numerous figs. and tables, 5 plates (fold.), bibliog. p. 510–544 (866 titles), numerous foot-refs. (For abstract on his **Glacial geology and the Pleistocene epoch,** *see* G-114, July 1950, *MAB.*) **DWB** (551.79 F624gL), **DLC** (QE696.F54)—Although this is considered a "new book" and not a second edition of the 1947 text by the same author, the majority of chapters are the same, though a great deal of additional material has been added (and an equal amount deleted), and most of the material has been revised and updated through 1956 to include the rich literature on pollen analysis, deep sea stratigraphy, permafrost and periglacial studies and C^{14} dating. Emphasis is on North American findings. The 27 chapters include: 2) origin and movement of glaciers; 3) regimen of glaciers; 4) distribution of glaciers in area and altitude; 5) glacial transport and erosion; 10) drainage and Eolian features; 11) frozen ground; 12) weathering, soils and streams; 13) lakes in nonglacial regions; 16) stratigraphy; 17) geochronology, 18) North America during the last glaciation; 22) glacial geography of Europe; 24) glaciation outside North America and Europe; 25) deep sea stratigraphy; 26) Pleistocene fossils and 27) causes, in which climatic changes and glacial climates are discussed extensively. *Subject Headings:* **1. Glacial geology textbooks 2. Pleistocene glaciation 3. Geochronology 4. Pollen analysis 5. North America.**—*M.R.*

10.11–13 551.521

†Foitzik, Leonhard and Hinzpeter, Hans, **Sonnenstrahlung und Lufttrübung.** [Solar radiation and atmospheric turbidity.] Leipzig, Akademische Verlagsgesellschaft Geest & Portig, **1958.** 309 p. 80 figs.+8 figs. (in color), 364 refs. Price: DM 43—(*Probleme der Kosmischen Physik*, Vol. 31) **DLC** (QC911.F76). Review by O. Czepa in *Beiträge zur Geophysik*, Leipzig, 68(3):188–189, **1959.** Review by H. Koschmieder in *Beiträge zur Physik der Atmosphäre*, Frankfurt a.Main, 32(1/2):125–126, **1959.** Review by Wolfgang Collmann in **Annalen der Meteorologie,** Hamburg, 8(9/10):316–317, **1959.** Review by I. A. Khvostikov

in *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 9:1438–1439, Sept. **1959.**—This substantial monographic treatise is an outgrowth of a work planned, before his death in 1943, by Otto Hoelper, and developed further by F. Linke who also died during World War II. The early plans, however, were not carried out so the present authors have prepared a completely new text on the basis of recent advances by the authors and their contemporaries (through 1956). Nine major chapters deal with: 1) solar radiation, its optical, thermal and spectral properties; 2) the atmosphere (composition, structure, ozone, water and aerosols); 3) absorption and extinction in gases, scattering, line and band absorption and absorption by N_2, O_2, O_3, CO_2, H_2O, etc.; 4) scattering by molecules of air, dust, etc.; 5) processes resulting from solar radiation penetration through the atmosphere; 6) actinometry and pyrheliometry; 7) the solar constant; 8) determination of turbidity from actinometric measurements and 9) determination of ozone, water vapor and dust by radiation measurements. An extensive bibliography of 364 references to literature in this field published from 1838 to 1957 and an author and subject index are appended. As is the case with all volumes of the famous **Probleme der Kosmischen Physik,** the quality of editing, binding, illustrative material, tabular and graphic data presentations and reference material is unequaled except in the case of **Advances in Geophysics.** And none of the Advances have quite the comprehensiveness of this excellent work. *Subject Headings:* **1. Solar radiation 2. Turbidity.**—*M.R.*

10.11–14 551.582.1(661) 551.583(661)

*†Capot-Rey, Robert (*Faculté des Lettres d'Alger*), **Le Sahara français.** [The French Sahara.] Paris, Presses Universitaires de France, **1953.** 564 p. 21 figs., 8 charts, 8 plates Bibliog. p. 495–541 (818 refs.)+bibliogs. and refs. throughout. (*Pays d'Outre-Mer*, 4*e Ser.*, *Géographie de l'Union Française*, No. 1, L'Afrique Blanche Française, Vol. 2). **DLC** (DT33.–D38)—Ch. I of this thorough treatise on the French Sahara discusses the hydrology of the desert; Ch. II the aridity of the soil and climate (character, causes, pressure and wind, temperature and evaporation, weather and rainfall types, and peculiarities of the arid regions) Ch. III climatic changes: types of evidence for quaternary and for historical period, etc. Many charts and folded maps showing rainfall, rainfall types, limits of desert areas, vegetation and cultivation, temperature, synoptic types for sand storms, indices of aridity, etc. Good reference lists are attached to each chapter and a long list of references appears at the end of the book. *Subject Headings:* **1. Climate of French Sahara 2. Climatic changes, Sahara 3. French Sahara.**—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **Aeronaut. climat., Zagreb-Lučko Airport** (Makjanie), 10.11–69; **Cloud seeding projects, Lérida, Spain,** 10.11–132.

10.11–15 550.34

*†Gutenberg, Beno (*Calif. Inst. of Technology, Pasadena*), **Microseisms.** *Advances in Geophysics*, N. Y., Vol. 5:53–92, **1958.** 10 figs., 6 tables, 182 refs. **DWB, DLC**—A systematic review of the latest knowledge and data on microseisms, their causes, measurement, relation to meteorological phenomena and to ocean waves, and the current theory. After a brief sketch on definitions of nomenclature, historical notes, units and symbols, the various instruments and arrangements used for investigation of microseisms are discussed, then artificial microseisms, natural microseisms with a period of <2 sec, with periods of 1–3 sec, 4 sec, 4 to 10 sec and 10 sec to several minutes are treated in separate chapters. In the final chapter on theory the transmission of energy from the surface to the bottom of the ocean, the energy problem and the period problem are reviewed. Finally, there is an extensive bibliography, valid through 1957. *Subject Headings:* **1. Microseisms 2. Microseism bibliographies 3. Advances in microseism research.**—*M.R.*

10.11–16 551.501.4:551.582.2:061

Landsberg, H. E., **Preparing climatic data for the user.** *World Meteorological Organization WMO* [*Publication*] No. 73. TP. 29; Technical Note, No. 22, **1958.** 18 p. 10 figs., 11 ref.

French, Russian and Spanish summaries. **DWB, DLC.** Review by K. Cehak in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(1):162, **1959.** Review by B. N. Charles in *American Meteorological Society Bulletin*, 40(11):580, Nov. **1959**—Remarks on uses and methods of compiling climatic data from the days of THOMAS JEFFERSON (1782) to date, with samples of JEFFERSON'S and of recent U. S. W. B. tabulations and indexes, plus microfilmed punched cards shown in supplement. Examples of graphical presentation of climatic data of different types are also included. Use of electronic computers for frequencies or analyses of data for engineering or agriculture as carried on at Asheville, N. Carolina, by the U. S. W. B., is stressed. (Note: This monograph is a greatly expanded version of the paper by the same title run as 9.7–96, July 1958, *MAB* and is essentially a different paper.) *Subject Headings:* **1. Climatic data presentation 2. Electronic computers 3. National Weather Records Center. I. Jefferson, Thomas.**—*M.R.*

10.11–17 551.501.81

Henderson, J. P.; Lhermitte, R.; Perlat, A. et al., **Use of ground-based radar in meteorology (excluding upper-wind measurements).** *World Meteorological Organization, WMO [Publication]* No. 84.TP.35; Technical Note, No. 27, **1959.** 80 p. 28 figs. **DWB, DLC**—A standard type of **WMO Technical Note,** giving the latest information, in well organized form, on theory and practice of radar weather observation: Ch. 1—theory; Ch. 2—types of radar and displays; Ch. 3—recording and transmission of data and information; Ch. 4—types of precipitation echo (layer type, convective type, thunderstorm, hurricane or typhoon, tornado or waterspout, hail, snow, lightning); Ch 5—miscellaneous types of echo (anomalous propagation, angels, smoke, dust, storm, insects, birds, etc.); Ch. 6—practical application (short period and aviation forecasts, approach and landing, briefing and flight planning, take-off and climb, flight at cruising level, icing, severe storm warning, hydrology and climatology, synoptic analysis, marine application). Finally, in Ch. 7, the use of radar in meteorological research is treated in 12 paragraphs, among them one on echo intensity and rate of rainfall, movement of precipitation belts, growth and decay of precipitation areas, Doppler radar, turbulence effects, etc. In the appendix there is a series of 28 radar photographs showing various types of echoes as outlined in Ch. 4, each with an explanation of conditions. Half of the photos are from U. S. sources and half from U. K. sources. *Subject Headings:* **1. Radar weather observation. I. Rockney, V. D. II. Sellick, N. P. III. Jones, R. F. IV. WMO. Commission for Instruments and Methods of Observations.**

10.11–18 551.513:551.510.52/3(99)

Alt, Jean (*Mét. Nationale, France*); Astapenko, Paul (*Leningrad Hydromet. Inst., U.S.S.R.*), and Ropar, N. J., Jr. (*U. S. W. B., Wash., D. C.*), **Some aspects of the Antarctic atmospheric circulation in 1958.** *International Geophysical Year, 1957/1958. IGY World Data Center A (Natl. Academy of Sciences, Wash., D. C.), IGY General Report Series*, No. 4, May 11, **1959.** 28 p. 85 figs., 6 refs. **DWB, DLC**—The IGY Antarctic Weather Central operated from early 1957 through 1958, being staffed by meteorologists from 7 countries. This large report discusses and illustrates Antarctic circulation by means of analyzed charts (mean 700, 500, 300, 200, tropopause and 50 mb) and surface cyclone track charts and cross sections from 1000–50 mb for each month of 1958, based on radio reports, "CLIMAT" reports, etc. Circulation types are defined and illustrated, schematically. Tropopause and frontal conditions, comparison between 1957 and 1958, monthly features, etc. are discussed in detail. Cyclonic activity continues throughout the year but is more intense over the continent in summer than in winter. Over the ocean seasonal changes are not important. A permanent surface inversion is noted from March to November. The cyclones penetrate as far as the South Pole even in winter and the circulation of the Antarctic is an integral part of the Southern Hemisphere circulation. The tropopause is lower in summer (January) than in winter (July), owing to cold stratosphere in winter (−75 to −80°C in July compared with −50°C in Jan.). Only rarely does the tropopause disappear and that at far inland stations. A strong 50 mb jet is noted over the Antarctic coast in spring and fall, due to seasonal transition from a warm to a cold (or vice-versa) stratosphere. *Subject Headings:* **1. Antarctic circulation 2. Mean monthly upper level charts—Antarctic 3. Upper level charts—Antarctic 4. Antarctic tropopause 5. Antarctica.**—*M.R.*

10.11–19 551.584.43:551.525:633.51(584.4)

*†Zuev, Michail Vasil'evich, **Formirovanie mikroklimata khlopkovogo polia.** [Formation of the microclimate of a cotton field.] Leningrad, Gidrometeoizdat, **1956.** 115 p. 40 figs., 47 tables, 54 refs. **DWB** (M84.43.Z94fo)—A sizeable pamphlet giving the results of research on radiation heat and moisture balance and other meteorological elements in a cotton field during the growing season based on observational data obtained during 1952–3, at the agrometeorological experimental station at Boz-Su, Uzbekistan. Earlier microclimatic work was performed in cotton crops at Boz-Su in 1933 and 1938 and at other places in Central Asia. Literature is reviewed, methods of observation and calculations are set forth, with theory and examples included. Then a chapter on radiation and heat balance of a cotton field, with data on albedo variations throughout the day in a cotton field and the diurnal mean and extreme values of radiation balance, data on total evaporation and transpiration and evaporation from soil; a chapter on soil temperature and one on air temperature in a cotton field (diurnal and day to day, and seasonal as well as changes dependent on state of crops); inversions in daytime and, finally, humidity (absolute and relative) in air and crops, and saturation deficit. Many curves as well as tables illustrate results. (For shorter article with same title, *see* 9.11–93, Nov. 1958, *MAB.*) *Subject Headings:* **1. Cotton field microclimatology 2. Soil-air heat exchange 3. Soil temperatures 4. Albedo of cotton field 5. Uzbek S.S.R. 6. Boz-Su Experimental Station, Uzbek S.S.R.**—*M.R.*

10.11–20 551.574.42:551.509.318(73)

*§†Bennett, Iven, **Glaze: its meteorology and climatology, geographical distribution, and economic effects.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical Report,* EP-105, March **1959.** 217 p. 48 figs., 15 tables, numerous refs. **DWB** (M86.U585t No. 105)—Pt. I. Extensive information contained in the literature and data from published and unpublished (commercial) sources on frequency, intensity, morphology, physical processes for formation, characteristics, synoptic conditions in U. S., influence of microclimate and wind conditions; II. Geographical distribution in the U. S. and abroad (N. A., S. A., East Asia, Europe) and III. Economic consequences for utilities, buildings, highways, cross-country vehicular traffic, railroad transportation, pedestrians, forests and trees, animals and crops. Maps of glaze frequency and intensity in the U. S., based on utilities records for different periods of time, are presented and discussed. Results of studies made at various places in the U. S. and in Europe are summarized or quoted. *Subject Headings:* **1. Glaze frequency data 2. Synoptic conditions for glaze 3. United States.**—*M.R.*

10.11–21 551.521

*†Coulson, Kinsell L., **Flux of radiation from the top of a Rayleigh atmosphere.** Calif. Univ. at L. A. Dept. of Meteorology, Contract AF 19(604)-2429, Scientific Report, No. 1, Jan. **1959.** 176 p. 57 figs., tables, 81 refs.—A voluminous report on results of a study of radiative transfer from the outer limits of the atmosphere, using CHANDRASEKHAR'S theory for a plane-parallel atmosphere, using high speed electronic computers for determining intensity, polarization (degree and plane) and example of data are presented in tables and charts, and graphs. Intensity of outward radiation is in general similar to intensity of skylight as determined by SEKERA et al., at short wave lengths or low sun elevation it is more intense. Albedo of underlying surface is more important than in the case of skylight. For long wave lengths the outgoing radiation is almost all reflected radiation. Ground reflection decreases polarization. Neutral points are equivalent but not identical to BABINET, BREWSTER and ARAGO points but with directions of sun and antisolar point interchanged. Molecular scattering accounts for 7.6% of albedo or 6.9% if allowing for ozone absorption. *Subject Headings:* **1. Outgoing radiation flux 2. Albedo of earth surfaces 3. Scattering.**—*M.R.* (*from author's abstract*).

10.11–22 551.582(436)

*†Steinhauser, Ferdinand; Eckel, Othmar and Lauscher, Friedrich (*eds.*), **Klimatographie von Österreich.** [Climatography of Austria.] *Akademie der Wissenschaften, Vienna, Denkschriften der Gesamtakademie,* Vol. 3, **1958–.** "Vol. 3 to be issued in 4 sections." Price per "Lieferung": 7.15; per vol.: 28.60, from Springer-Verlag, Vienna. Lieferung [Installment] 1 (p. 1–136, with 26 figs., 5 maps in color, bibliogs.) contains following articles: Hader, F.,

Geographische Grundlagen, p. 1–12. Sauberer, F. and Dirmhirn, Inge, **Das Strahlungsklima,** p. 13–102. Steinhauser, F., **Sonnenschein,** p. 103–136. **DWB** (M(055)A313de), **DLC.** Review in *Royal Meteorological Society, Quarterly Journal,* 85(365):319, July **1959.** Review by W. Mörikofer in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* Vienna, 10(1):154–158, **1959.**—The climate of Austria is extremely varied due to the country's central position between the Mediterranean, continental and maritime climatic zones, and the contrasts in elevation provided by its Alpine geography. This volume is the first in a series of studies on the regime of different climatic elements in Austria, prepared by a group of climatologists of the excellent Vienna school. After a brief geographical outline, in which the country's 9 climatic zones are described, the radiation climate is taken up, emphasizing the importance of radiative energy exchange as the primary source of meteorological and climatological phenomena. The third article is on sunshine. Carefully prepared tabular and graphical data and ample literature references are given. Maps on the physical geography of Austria and on sunshine duration are appended. The three articles are being abstracted separately. *Subject Headings:* **1. Climate of Austria 2. Regional climatology 3. Austria.**—*G.T.*

10.11–23 551.579.4(479,584)

*†Bogoliubova, Irina Vladimirovna, **Selevye potoki i ikh rasprostranenie na territorii SSSR.** [Flash floods and their distribution in the U.S.S.R.] Ed. by B. D. Zaĭkov. Leningrad, Gidrometeoizdat, **1957.** 150 p. 19 figs. (incl. maps and photos), 17 tables, 136 refs. **DLC** (GB665.B6). Review by M. V. Velikanov in *Meteorologiia i Gidrologiia,* Leningrad, No. 9:52–53, Sept. **1957. DWB**—A monograph covering the history of investigations of flash floods, a review of literature, classification, factors leading to mud and water floods of this type, respectively, hydrographic aspects and forecasting, empirical studies, seasonal variations and, finally, the geographic distribution of flash floods in the U.S.S.R., with maps showing locations (Caucasus, Central Asia and Siberia). These flash floods occur either in high mountains or in arid regions, where storms produce sudden falls of rain or rapid melting of snow in small watersheds with steep slopes. Because of the dryness or looseness of soil and talus, and volume and speed of current, a high percentage of the "flood" consists of solid material (soil and rock) and produces severe erosion; sometimes huge boulders are transported. *Subject Headings:* **1. Flash floods 2. Caucasus, U.S.S.R. 3. Asiatic U.S.S.R.**—*M.R.*

10.11–24 551.585.7:551.594(234.3)

†Israël, Hans, **Atmospheric electric and meteorological investigations in high mountain ranges.** Germany. Deutscher Wetterdienst (Meteorological Observatory, Aachen), Contract AF 61(514)-640, ("Alpen-Programm" 1954–57), Final Report, **1957.** 158 p. 17 figs., 11 tables, refs., bibliog. p. 146–154, eqs.—Potential gradient, air-earth current, local sky brightness, meteorological conditions, polar electric conductivity, condensation nuclei content, radioactivity of the air, solar radiation, and ozone content measurements were made over a period of 13 months at several stations between 200 and 3500 m in the Swiss Alps. This final report summarizes the project, equipment, techniques and results of these measurements, and gives a rough outline of the atmospheric electric climate of the area. The relation of condensation nuclei and sferics to the atmospheric electric processes, austausch and thunderstorms, and of sky brightness, turbidity and ozone content and electricity of disturbed weather are considered. *Subject Headings:* **1. Atmospheric electricity 2. Mountain observations 3. Alpine meteorology 4. Swiss Alps.**—*M.R.*

10.11–25 551.582.2

†*Great Britain. Meteorological Office, **Tables of temperature, relative humidity and precipitation for the world, Pt. 1–6,** issued as its *M. O.* [*Publication*], 617a–617f, **1958.** All almost entirely tables. **Pt. 1, North America, Greenland and the North Pacific Ocean.** 84 p. 39 refs. **Pt. 2, Central and South America, the West Indies and Bermuda.** 53 p. 79 refs. **Pt. 3, Europe and the Atlantic Ocean north of 35°N.** 159 p. 205 refs. **Pt. 4, Africa, the Atlantic Ocean south of 35°N and the Indian Ocean.** 220 p. 213 refs. **Pt. 5, Asia.** 128 p. 155 refs. **Pt. 6, Australasia and the South Pacific Ocean including the corresponding sectors of Antarctica.** 54 p. 37 refs. "Vol. 1–6 will also be published in one composite volume." **DLC, DWB.** Review by O. M. Ashford in *World Meteorological Organization, WMO Bulletin,*

7(4):188–189, Oct. 1958. **DWB**—The purpose of this series of climatic data publications is to make available in handy booklet form climatic tables for all parts of the world prepared by the World Climatology Branch of the Meteorological Office during past years. A map of the world shows the 6 regions into which the world is divided and a map shows location of stations in each volume. Data include monthly mean and extreme temperature, 0900 and 2100 (or analogous hours) relative humidity, precipitation, maximum precipitation and number of days precipitation and coordinates of station, length of record, etc. Each of the 6 sections contains tables for from 150 to 600 stations, plus an extensive bibliography arranged by countries giving sources of data and an alphabetical place index. *Subject Headings:* **1. Climatic tables for world 2. World temperature, humidity and precipitation tables 3. Global climatology.**—*M.R.*

POPULAR METEOROLOGY

10.11–26 551.5(023)

Forrester, Frank H., **Real book about the weather.** Illus. by James MacDonald. Garden City, N. Y., Garden City Books, **1958.** 218 p. Price: $1.95. **DWB** (M F731re). Review by J. R. Fulks in *American Meteorological Society, Bulletin,* 40(11):583, Nov. **1959.**—A new popular book on practical aspects of the weather: geophysics, atmosphere, water cycle, air masses, storms, optics (sky color), weather and health, weather facts and fancies, history of weather study and weather maps and forecasts. *Subject Heading:* **1. Popular meteorology.**—*M.R.*

10.11–27 551.509.2:621.397.9

§Higgins, John Joseph, **Your T. V. weather map.** Glasgow, Blackie, **1958.** 90 p. figs. **DLC** (QC995.H5). Review in *Royal Meteorological Society, Quarterly Journal,* 84(362):481, Oct. **1958.**—A popular "pocket size," but high quality guide to understanding of the T. V. weather maps broadcast since January 1954 in the United Kingdom, written by an ex-(World War II) R. A. F. weather forecaster-instructor. The basic ideas of synoptic meteorology, relation of isobars to wind direction, to wind force and to weather, a typical flight through a depression, through a cold front; clouds and rain, 3 dimensional model of weather for a station and for a moving system; the synoptic conditions producing smog or fair weather in the cold season, producing snow or rain; unusual spring and summer of 1956 and, finally, situations in 1954, 1955 and 1956 are treated in short separate, well illustrated chapters. Many surface synoptic charts are reproduced. *Subject Headings:* **1. Television weather maps 2. Elementary synoptic meteorology 3. United Kingdom.**—*M.R.*

10.11–28 551.509.34(26)

§Zubkov, A. E., **Predskazanie pogody na more po mestnym priznakam.** [Forecasting weather at sea from local phenomena.] Moscow, Izdatvo. Morskoĭ Transport, **1958.** 85 p. 26 figs., table. **DWB** (Mo9.3Z93pr)—A popular "pamphlet" type book giving first the basic facts and methods used in scientific or synoptic forecasting (with illustrative charts) and then in more detail the best knowledge as to coming weather which can be obtained from local signs: clouds (cirrus of various types, cumulus, stratus, cloud movements), clear sky, wind (wind veering or backing, sea and mountain breezes), pressure and pressure changes; temperature; humidity, dew point, precipitation (rain, snow, hail, dew, and frost), fog, visibility, halos and other optical phenomena of clouds, clear sky or twilight (mirages); acoustical phenomena, radio or radar, ocean waves and tropical cyclone prediction. Rules are systematically summarized in an appended table. *Subject Headings:* **1. Local forecast rules 2. Marine forecasting.**—*M.R.*

10.11–29 551.59

Kalitin, N. N., **Opticheskie iavleniia v atmosfere.** [Optical phenomena in the atmosphere.] Leningrad, Gidrometeoizdat, **1948.** 43 p. 15 tables, 21 figs. (some in color) 4 refs.—A popular (15,000 copies) but competent pamphlet for observers in the hydrometeorological service, covering all manner of optical phenomena, such as the form of the sky, blue of the sky, refraction, solar or lunar distortion on the horizon, mirage, twinkling of stars, twilight, red sunsets, rainbows, halos and coronas. The brochure is not lacking in schematic drawings and technical information of a high order, in addition to vivid color photos or paint

ings of red and yellow color of sunset under maritime polar, maritime arctic, continental arctic and continental tropical air. *Subject Headings:* **1. Optical phenomena 2. Twilight coloration under various air masses.**—*M.R.*

10.11–30 523.7

Newton, H. W., **Face of the sun.** London, Harmondsworth: Penguin Books, **1958.** 208 p. 37 figs., 15 refs. Price: 2 sh 6 d. **DLC** (QB521.N4). Review by C. W. Allen in *Science Progress*, London, 47(186):344–345, April **1959.** Review by H. C. Shellard in *Weather*, London, 14(7):238, July **1959.**—A thorough, popular science monograph on all aspects of solar surface phenomena and their important effects on the terrestrial atmosphere: magnetic storms, the aurora, radio-propagation (ionosphere) and weather, rainfall and tree-rings, from an historical as well as a modern (e.g., IGY program) viewpoint. The photosphere, chromosphere, corona, sunspots, solar rotation, spectroscopy, cycles of 11-years, Zurich numbers and Greenwich areas, characteristics of sunspots, magnetic field theories, giant sunspots (1859, 1892, 1921, 1926, 1946, 1947), the 25 biggest sunspots, flares and prominences, geomagnetic records and disturbances, radio waves and cosmic rays from the sun, aurora, weather "cycles," solar constant, cosmology, and stars outside our system are considered. Numerous plates and drawings and a good subject index are included. It is odd that the 5 greatest (of 25) sunspots in 70 years (1874–1954) occurred in 6 years (1946–51). *Subject Headings:* **1. Solar physics 2. Solar terrestrial relationships 3. Sunspots.**—*M.R.*

10.11–31 550.3(023)

Spilhaus, Athelstan Frederick, **Satellite of the sun: the science of the earth and its surroundings.** Introd. by Allen Tate. N. Y., Viking Press, **1958.** 119 p. photos, 7 refs. **DWB** (525 S856sa), **DLC**—The basic knowledge of the universe, sun, earth, earthquakes, oceans, atmosphere, Arctic, Antarctic, rockets, satellites, the aurora, cosmic rays, meteors, etc. is sketched for the non-scientific reader, and illustrated with action photographs. Future uses for knowledge of geophysics and astrophysics are outlined in the last chapter: power from sun and wind, water from the sea, cloud seeding, climatic control and other engineering projects. A subject index is provided. *Subject Headings:* **1. Geophysics 2. Popular geophysics.**—*M.R.*

MANUALS AND HANDBOOKS

See also: **Marine met. obs. manuals, 10.11–90.**

10.11–32 551.521.326:535.24(02)

*Roach, F. E., **Photometric observation of the airglow.** *International Geophysical Year, 1957/1958 Annals*, Vol. 4:115–138, **1957.** 21 tables, 17 refs., 5 eqs. **DWB**—The purpose of this manual is to suggest standards to be employed during the IGY in areas of airglow observation in which standardization is possible. The unit of absolute intensities (the Rayleigh), the principal spectral features deserving study during the IGY, methods of observation and calibration, sources of error, and standardization of data processing are discussed in detail. *Subject Headings:* **1. Airglow investigations 2. IGY airglow manuals 3. Photometer observation of airglow.**—*G.T.*

10.11–33 551.573:581.1(02)

†**Handbuch der Pflanzenphysiologie, Band 3, Pflanze und Wasser** [Encyclopedia of Plant Physiology, Vol. 3, Water relations of plants], ed. by Wilhelm Ruhland and O. Stocker. Berlin, Springer-Verlag, **1956.** 1073 p. figs., tables, bibliogs. throughout. Author index (including refs. to names in the bibliogs.), German-English and English-German subject indexes. Added title page in English. Pertinent articles abstracted separately. **DLC** (QK711.R83)—This voluminous and detailed handbook contains a series of articles on water and plant life, starting with basic problems (Ch. I), then (Ch. II) covering cell physiology (structure of water, dissociation, electrical properties, physical properties of flowing water, freezing and glazing phenomena; state of water in cells and tissues, osmosis and permeability, diffusion, ion movement); Ch. III. water absorption from rivers, lakes, seas (KALLE), at-

mosphere-fog-precipitation (GEIGER); soil, physiological and physical aspects, environmental factors, roots, leaves, seeds, etc.; IV. water release from plants, transpiration (O. STOCKER), physiology and morphology of plants during transpiration, cuticular transpiration, stomatic transpiration and dependence on environment, bleeding and excretion; V. water pressure conduction and movement in plants and in aquatic or submerged plants; VI. Water balance; water consumption, drought resistance (O. STOCKER); VII. Water economy of ecological plant types—thermic and hygric climates, precipitation, drought and fog in geographical zones (by C. TROLL); zerophytes, mesophytes, hygrophytes, hydrophytes, epiphytes, halophytes and parasites; with microclimatic factors, transpiration, etc. Each article has ample tabular and graphical data based on quantitative experiments and observations under varying conditions, and long reference lists and at the end there is >110 pages of author and subject (German and English) indexes. *Subject Headings:* **1. Plant physiology handbooks 2. Plant ecology 3. Water balance of plants 4. Evapotranspiration. I. Ruhland, W.** (*ed.*) **II. Stocker, O.** (*ed.*) **III. Thornthwaite, C. W. IV. Kalle, K. V. Geiger, R.**—*M.R.*

10.11–34 551.579(02)

*Chebotarev, Aleksandr I. and Klibashev, K. P., **Gidrologicheskie raschety: sbornik uprazhneniĭ.** [Hydrological computations: collection of exercises.] Leningrad, Gidrometeoizdat, **1956.** 295 p. 51 figs., 103 tables + 18 in appendix, 12 refs., 131 eqs. **DWB** (M79 C514g), **DLC** (GB665.C47)—A practical workbook for hydrology students, giving problems and their solutions in all fields of hydrometeorology: I. Characteristics of basins; II. Calculation of snow survey data, rainfall and evaporative losses, and other hydrometeorological computations; III. Water balance equations, normal runoff; IV. Fluctuations of annual runoff; V. Seasonal runoff; VI. Maximum discharge from spring floods, hydrograph construction; VII. Rain flood hydrographs and VIII. Silting of basins. Appended are about 80 pages of tables of data for a number of places in the U.S.S.R., using all of the data on record, and examples of completed calculations on standard forms for publication, etc. Computation table and nomograms are also included. *Subject Headings:* **1. Hydrometeorological calculations 2. Hydrology manuals.**—*M.R.*

10.11–35 551.501.4(02)

Leningrad. Glavnaia Geofizicheskaia Observatoriia, **Rukovodstvo po pervichnoĭ obrabotke materialov meteorologicheskikh nabliudeniĭ.** [Handbook for the initial processing of meteorological observations.] Leningrad, Gidrometeoizdat, **1957.** 303 p. 59 figs., 166 tables. **DWB** (M01 U582ru, 1957)—Extremely detailed and systematic instructions are given, together with examples for working up data and forms for pressure, temperature, humidity, clouds, wind, precipitation, snow cover at regular stations, snow survey data, visibility, atmospheric phenomena; soil temperature, solar radiation, and pluviograph records in the Soviet Hydrometeorological Service. General checking for superficial errors in observer's forms and in autographic records; critical verification by synoptic and statistical methods and by comparison of one station with one or more neighboring stations, or with another station, for several months; graphical correlations between stations or elements, and many other ways of detecting errors are set forth and illustrated with numerous actual examples in tabular, graphic or cartographic form. *Subject Headings:* **1. Data processing handbooks 2. U.S.S.R. Hydrometeorological Service.**—*M.R.*

10.11–36 551.506.7:551.508.822(02)

U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, **Rukovodstvo po podgotovke aerologicheskikh ezhegodnikov, Chast' 3, Temperaturnoe zondirovanie atmosfery.** [Instructions on the preparation of aerological yearbooks, Pt. 3, Temperature soundings of the atmosphere.] [2d ed.] "Compiled by the Tsentral'naia Aerologicheskaia Observatoriia." pub. Leningrad, **1958.** 126 p. forms, tables, 10 refs. "1st ed., 1952, compiled by the Glavnaia Geofizicheskaia Observatoriia." **DLC** (QC878.R83 Vol. 3)—The handbook on the preparation of aerological yearbooks consists of 3 parts: I. single station wind observation (*see* 10.9–34, Sept. 1959, *MAB*); II. observations with a base line; III. temperature soundings. Pt. III was first published in 1952 by the GGO, and was revised in 1956 by the Central Aerological Observatory (Ts. A.O.). Critical evaluation of temperature soundings by means of

charts of isobaric topography or by means of comparisons with previous or subsequent soundings, comparisons of radiosonde and aerological meteorograph soundings, verification of records, graphs, tables, messages, ship observations, single station and base-line observation and, finally, verification of published results (yearbook) of soundings. Examples of specific forms, tables and procedures are given throughout the manual and in the appendix. *Subject Headings:* **1. Radiosonde data verification 2. Aerological yearbooks 3. Instructions for aerological yearbooks. I. Moscow. Tsentral'naia Aerologicheskaia Observatoriia.**—*M.R.*

10.11–37 551.5:629.12(02)

U. S. Office of Naval Operations, **Meteorology for naval aviators.** Issued by the Office of the Chief of Naval Operations, Aviation Training Division. *U. S. Office of Naval Operations, NAVAER* 00-80U-24, **1958.** Loose-leaf. Each section repaged. Numerous figs., forms and photos. "Supersedes *NAVAER* 00-80U-22, **Aerology for naval aviators,** pub. **1952.**" Price: $2.00 from U. S. Govt. Print. Off., Wash., D. C. **DLC** (TL556.U653), **DWB** (M(055) U585n)—A standard type (although more comprehensive than usual) training manual covering the basic principles of meteorology (atmosphere, wind systems, stability, air masses and fronts), and applications (synoptic maps, NWAC, networks, communications channels, thunderstorms, fog, low ceilings, icing, jet stream, radar and weather, flight planning, operations at sea, world weather, flight problems, pressure pattern flying and the Naval weather service). Scores of schematic diagrams and charts, cross sections, models and illustrative photos are included, and a subject index appended. *Subject Headings:* **1. Aeronautical meteorology manuals 2. Naval aeronautical meteorology.**—*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

GEOPHYSICS

See: **IGY geophysics program** (Veĭtsman, Gal'perin), 10.11–38.

IGY

See also: **IGY oceanog. program,** 10.11–2; **IGY Antarctic Weather Control** (Alt), 10.11–18; **IGY Antarctic program,** 10.11–49.

10.11–38 550.3:551.506.22

Veĭtsman, P. S. and Gal'perin, E. I., **Izuchenie stroeniia zemnoĭ kory v oblasti perekhoda ot Aziatskogo kontinenta k Tikhomu okeanu.** [Studies on the structure of the earth's crust in the transition zone between the Asiatic continent and the Pacific Ocean.] *Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu Mezhdunarodnogo Geofizicheskogo Goda, Informatsionnyĭ Biulleten'*, No. 3:76–82, **1957.** fig., 22 refs. **DLC**—These studies consisting of seismic refraction, aeromagnetic and other geophysical investigations, as well as geological dryland and oceanographic studies, will be carried out during the IGY in the region of Sakhalin Island—Kamchatka—Kuril Islands and Straits by a complex geological-geophysical expedition of the Institutes of Terrestrial Physics, of Oceanography and other institutions of various U.S.S.R. ministries. The study of the structure of the earth's crust in the transition zone requires a special method of investigation and the use of special equipment which are discussed in detail by the authors. *Subject Headings:* **1. IGY geophysics program 2. Earth's crust 3. Sakhalin Islands 4. Kuril Islands.**—*A.M.P.*

10.11–39 550.3:551.506.22

†Československý Rozhlas, **O Mezinárodnim geofysikálnim roce.** [International Geophysical Year.] Ed. by Ivo Budila. Prague, Naše Vojsko, **1958.** 257 p. 114 figs., 8 plates, 48 refs. **DLC** (QC801.3.C4)—This is a collection of lectures delivered in the "Radio University" series of the Czechoslovak Radio. Most of the authors were members of the Czechoslovak IGY Commission. Basic problems and current status of each of the disciplines of IGY are described and plans of the IGY in general and Czechoslovak participation in particular

are briefly outlined. Czechoslovakia was to participate in all phases of the program except oceanography and glaciology. The work was to be done by regular station networks, some stations established with particular attention to the IGY and by amateurs (aurora, nightglow, satellites). A chart showing locations of Czechoslovak IGY stations is included. Cosmic ray measurements are made at Prague and at Lomnický Štít, the latter being one of 17 mountain stations of the world. Two of the ionospheric stations have been equipped with latest instruments. Meteorological surface data for Prague, Brno, and Košice, and aerological data for Prague and Poprad will be submitted. Ozone is to be measured at Hradec Králové, solar radiation at several regular stations, and chemical composition and radioactivity of rainwater is to be analyzed. Solar activity, geomagnetism, seismology, gravimetry, longitudes and latitudes and satellite observations are also studies in which Czechoslovakia will participate. As a whole, this series of lectures, in addition to containing general information on the IGY, can be considered a competent and readable introduction to geophysics. *Subject Headings:* **1. IGY program 2. Czechoslovak participation in IGY. I. Budila, Ivo.** (*ed.*).—*G.T.*

10.11–40 551.507.362.2:551.506.22

International Geophysical Year, 1957/1958. IGY World Data Center A (Rockets and Satellites), **Reports and analyses of satellite observations.** Its *IGY Satellite Report Series* No. 6, Aug. 15, **1958.** 60 p. figs., tables. **DWB** (629.1388 R425re) "*consists of Smithsonian Institution. Astrophysical Observatory, Special Reports*, No. 15 and 16, and excerpts from *Special Report*, No. 14." All abstracted separately.—This Report contains in its first section a catalog of moonwatch observations and is a continuation of the catalogs in *Smithsonian Astrophysical Observatory, Special Report*, No. 11 and No. 12. The rest of the report is devoted to a preliminary note on the mass-area ratios of satellites 1958 Alpha 1 and Alpha 2, the descent of satellite 1957 Beta 1 and its positions during the first 100 revolutions. *Subject Headings:* **1. IGY satellite program 2. Satellite tracking.**—*N.N.*

10.11–41 551.506.22(41–4

International Geophysical Year, 1957/1958. British National Committee, **Progress of the United Kingdom program.** *American Geophysical Union, Transactions*, 39(6):1219–1223 Dec. **1958. DWB, DLC**—The reports of the first twelve months of the United Kingdom IGY program are summarized. Summary reports on British meteorological program, studies on glaciology, oceanography, geomagnetism, aurora, ionospheric physics, solar activity, rockets and satellites, seismology and gravity are given. *Subject Headings:* **1. IGY program 2. British participation in IGY.**—*N.N.*

10.11–42 550.3:061.

Fifth General Assembly of the IGY. *American Geophysical Union, Transactions*, 39(6) 1211–1213, Dec. **1958. DWB, DLC**—About 365 scientists from 35 countries participated in the Fifth General Assembly of IGY, held in Moscow July 30–Aug. 9, 1958, to review the status of IGY as it approached its end and to consider the future needs in geophysics and possible international cooperation in other scientific fields. *Subject Headings:* **1. IGY meetings 2. Moscow, U.S.S.R.**—*N.N.*

10.11–43 550.3:061.

†Da Costa, J. F., **Souveraineté sur l'Antarctique.** [Sovereignty of the Antarctic.] Paris Librairie Générale de Droit et de Jurisprudence, **1958.** 249 p. 5 figs., foot-refs., bibliog p. 102–236. On cover: Expéditions Polaires Françaises. Missions Paul-Emile Victor. **DLC** (JX1393.A5C6)—Legal and political questions raised by the joint occupation of the Antarctic continent during IGY, various claims for sovereignty over certain sectors, geographical aspects, history of French attitudes toward the appropriation of territory in the Antarctic and present policy and, finally, an annotated bibliography of >2000 works dealing with the claims of the interested states, and 32 international agreements or disputes, plus special and historical material, arranged under 50 headings and indexed by author and subject. The experience of Paul-Emile Victor in the French Antarctic expeditions plays a considerable part in the book. *Subject Headings:* **1. IGY Antarctic participation 2. Antarctic sovereignty. I. Victor, Paul Emile.**—*M.R.*

10.11–44 550.3:061.3

International Council of Scientific Unions, Wash., D. C., Oct. 2–6, 1958, [**Summary report of the 8th general session**]. *International Scientific Radio Union, Bulletin d'Information*, N°. 112:32–51, Nov./Dec. **1958. DLC**—This report includes a summary of the principal decisions arrived at by the General Assembly composed of the representatives of the national members (academies, research councils, etc.) and of the scientific members (unions). Particularly, important decisions were taken as regards the International Geophysical Year. A special committee (S.C.G.) was appointed for the international cooperation (inter-unions) in the geophysical field. Special committees for oceanic research (S.C.O.R.), Antarctic research (S.C.A.R.) and spatial research (C.O.S.P.A.R.), and an International World Days Service (I.W.D.S.) were likewise appointed. The questions concerning budget, statutes and rules of procedure of the joint commissions and the special committees have been revised. *Subject Headings:* **1. International Council of Scientific Unions (ICSU) 2. International Geophysical Year, 1957/58.**—*A.V.*

WMO

See also: **WMO Maritime Met. Commission meetings, 10.11–1.**

10.11–45 551.5:061.1

WMO membership now 100. *World Meteorological Organization, WMO Bulletin*, 8(2):58–59, April **1959.** graph. **DWB**—On March 29, 1959, the number of members of WMO reached 100, including 77 states and 23 territories. On Oct. 11, 1947, 42 countries signed the Convention and since then 41 of them have ratified it. Egypt and Syria have merged to form the United Arab Republic. Graph shows growth of WMO from Dec. 31, 1948. Mauritius, Saudi Arabia and Nicaragua have become members in 1959, and Ruanda-Urundi has asked to become a member. *Subject Heading:* **1. WMO membership list.**—*M.R.*

10.11–46 551.5:061.1(058)

World Meteorological Organization, **Annual Report, 1958.** Issued **1959.** 159 p. photos. (*WMO Pub.*, No. 86.RP.37) **DWB** (M(06) W927p)—A general review of programs and progress by WMO during 1958, including technical development, technical assistance, information service, external relations (IUGG, IGY, IAEA, ICSU, UNESCO, ICAO, etc.), resolutions of the General Assembly of UNESCO, meetings held in 1958, and activities in bibliography, vocabulary, aerology, marine and agrometeorology, climatology, hydrology, aeronautical meteorology, punched cards, CLIMAT data for world, world data centers for IGY and IGC (1959), microcards, publications, technical regulations, finances and staff problems, library, **WMO Bulletin** and other publications, list of members on Dec. 31, 1958, etc. For the first time a number of full page glossy photos are included, among them several showing activities of the data center under Mrs. London. A list of publications issued in 1958 is appended. *Subject Headings:* **1. WMO annual reports 2. IGY World Data Center.**—*M.R.*

ARCTIC RESEARCH

10.11–47 551.5:061.1

Annual Arctic Planning Session, Boston, Nov. 18–20, 1958, **Proceedings,** edited by J. H. Hartshorn. *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 15, April **1959.** 65 p. numerous figs., table. (For listing of papers, *see* Pt. 3, p. 1281, Aug. 1959, *MAB;* articles abstracted separately.) **DWB**—This is a summary of talks given at the First Annual Arctic Planning Session, Nov. 1958. The talks were on the subjects of: Lake Peters—The Arctic coastal research program; Ice-free land program; Arctic ocean studies; Arctic lake research; and related topics of general interest. *Subject Headings:* **1. Arctic research 2. Arctic geology 3. Arctic ice 4. Arctic oceanography 5. Permafrost 6. Arctic. I. Hartshorn, J. H.** (*ed.*)—*Author's abstract.*

10.11–48 551.311.184(268)

Crary, A. P. (*GRD, A. F. Camb. Res. Center, Air Res. and Development Command*), **Arctic ice island and ice shelf studies, Pt. 1.** *Arctic*, Montreal, 11(1):3–42, **1958.** 31 figs., 3 tables,

12 refs. **DLC**—This is a Pt. 1 of the elaborate report of scientific work as conducted "aboard" T-3, the floating ice island, and at the Ellesmere Ice Shelf under "Project Icicle," which started March 1952. Some physical characteristics of the ice island and the ice shelf are discussed here. Determination of ice thickness by seismic method and theoretical temperature curves are presented. Best fit of theoretical to observed temperature was at 7 m depth, an ice thickness estimated to 7 years of growth. Density in ice by the immersion method is shown. Internal ice temperatures were checked by Copper-constantan thermocouples at depths from 1.5 to 12.8 m, results of which are shown tabularly and graphically. Linearity of temperatures obtained indicates that the ice shelf is of uniform conductivity. A fresh-water lake with heavy pressure was discovered under the 2.5 m ice surface in 1952, in 1953 the ice was 3 m and by 1955 the lake was solidly frozen. Very large ice crystal formations indicated high pressure while freezing. Average monthly surface temperatures as recorded 1–3 years by the Sedov, Fram, SP-2, SP-3 and SP-4 expeditions are tabulated for comparison with 2 years records obtained at T-3 ice island. A number of other graphs are provided to show average inland temperatures at T-3, ice surface temperatures, and air temperatures close to ice surface at various locations. *Subject Headings:* **1. Arctic Ice Island (T-3) 2. Project "Icicle" 3. Ice thickness 4. Ice temperatures 5. Arctic 6. Ellesmere Island.**—*W.N.*

ANTARCTIC RESEARCH

See also: **Antarctic atmos. circulation** (Alt), 10.11–18; **Antarctic sovereignty** (Da Costa), 10.11–43.

10.11–49 551.506.22:91.04(99)

U. S. Navy. Task Force 43, **Operation Deep Freeze, 1957–1958: the story of Task Force 43 and its service to science in the third—the climax—phase of the IGY Antarctic Program.** Paoli, Pa., Dorville Corporation, **1958.** 231 p. Mostly photographs with legends. (For abstract on the 1955–1956 season, *see* 10.4–14, April 1959, *MAB.*) **DWB** (919.9 U585st)—An elegant and voluminous graphic account of the IGY Antarctic activities of the U. S. Navy in "Operation Deep Freeze," 1957–58. Full or double page color pictures and maps show the important military (naval) and scientific personnel, the geography and activities. Over 4000 men participated, including 72 IGY scientists, occupying 7 land stations and 10 ships at sea. An introduction by HUGH ODISHAW tells of the IGY program. Lists of various categories of personnel and their functions are appended. Meteorological and glaciological activities and personnel are well represented in the hundreds of photos and in the text. *Subject Headings:* **1. Operation Deep Freeze—1957–58 2. IGY Antarctic program 3. Antarctica.**—*M.R.*

SERVICES AND INSTITUTIONS

10.11–50 551.5:061

U. S. Weather Bureau, **Budget digest, 1958–1959.** Issued **1959.** 115 p. tables, figs. photos. **DWB** (351.72 U587b)—A graphic and pictorial perspective of the U. S. Weather Bureau's many activities, its history, organization, 1958–59 budget, etc. is presented to accompany the budget estimates for fiscal year 1960. Hurricane, flood, tornado, frost and fire weather warning services, research, climatology, marine aviation and international service and analysis center are among the major activities covered. *Subject Headings:* **1. U. S. Weather Bureau activities 2. U. S. Weather Bureau budget.**—*M.R.*

10.11–51 551.5:63:0

Stepanov, N. D., **Ob agrometeorologicheskom obsluzhivanii kolkhozov, sovkhozov MRS.** [The agrometeorological servicing of collective farms, state farms and machine tractor stations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:40, April **1958. DWB, DLC**—Collective farms, state farms and machine tractor stations need more than ordinary weather forecasts and warnings. They require specific hydrometeorological information applicable to agricultural work. The Ural Hydrometeorological Service prepares an information bulletin specially designed for these economic organizations, containing methods of evaluating agro

meteorological conditions and compiling information. The fundamental information worked up for practical needs by the local hydrometeorological station is provided by the Central Forecasting Institute. *Subject Headings:* **1. Agrometeorological services 2. Collective farms 3. Hydrometeorological services 4. U.S.S.R.**—*I.L.D.*

10.11–52 551.5(26):061.1

Hoover, Robert A. (*U. S. W. B., Wash. Natl. Airport, Wash., D. C.*), **Improvement in the marine program of the U. S. Weather Bureau.** *Mariners Weather Log*, Wash., D. C., (3):66, May **1958. DWB**—Personnel of the U. S. Weather Bureau make familiarization voyages on the North Atlantic, Caribbean and Gulf of Mexico from time to time in order to acquaint the forecasters with the users point of view of the weather service and to educate the weather map-makers and observers. As a result of these voyages and the work of Weather Bureau personnel connected with the marine program, improvement can be expected in Marine weather broadcasts from NSS. The following changes have already been made: (1) central pressures in Parts I and II are now in millibars instead of inches of mercury, (2) Arabic numerals are used instead of words, (3) new terminology has been introduced, (4) Fast moving gales and storm centers in Part I are given a map time position and a broadcast time position, (5) distribution and quality of the ship reports in Part IV are being improved. Other improvements being considered for the NSS marine broadcast are included in this report. *Subject Headings:* **1. U. S. W. B. marine program 2. Marine meteorology.**—*N.N.*

10.11–53 551.5:061.6

University Committee on Atmospheric Research, **Preliminary plans for a National Institute for Atmospheric Research.** Prepared for the National Science Foundation under Grant G 5807. Second Progress Report, Feb. **1959.** Each section repaged. Interim Report of the Committee on Meteorology of the National Academy of Sciences and the First Progress Report of the University Committee included in the appendix. **DWB** (M(051) U588pr). Also: Malone, Thomas F., **National Institute for Atmospheric Research.** *American Geophysical Union, Transactions*, 40(2):95–111, June **1959.** fig., table. **DWB, DLC**—Extensive and detailed plans and specifications for the proposed National Institute for Atmospheric Research are included in this elaborate report prepared after long and arduous work by the Committee representing the 14 universities participating and aided by 150 research scientists. Scientific considerations are paramount, but relations with the American Meteorological Society with respect to manpower, staff studies, architects plans for a building, including an ideal and comprehensive library (Groos), budget estimates for each year 1960–65 ($71 million-capital outlay, $33 million and operating expenses, $38 million); objectives, organization of the Institute and appended resolutions and statements from many sources are included. *Subject Headings:* **1. Institute for Atmospheric Research 2. Meteorological libraries. I. Houghton, Henry G.** (*chairman*) **II. Groos, Ob.**—*M.R.*

CONFERENCES AND SYMPOSIA

See: **Conf. on N. Atlantic Ocean-Atmos. Interaction, 10.11–2; Symposia Darcy, Dijon, 1956 (IUGG), 10.11–3; Arctic Planning Session, 10.11–47.**

EDUCATION, HISTORY AND BIOGRAPHY

BIOGRAPHY

10.11–54, 551.5:92

Vuorela, Lauri A. and Väisälä, Vilho, **Erik Herbert Palmén sixty years.** *Geophysica*, Helsinki, 6(3/4):127–129, **1958.** photo. **DWB, DLC**—This large volume of **Geophysica** is dedicated to Erik Palmén on his 60th birthday by 50 members of the Geophysical Society of Finland, and by the authors of 27 papers included in the volume (3 of the papers are in German,

and the rest in English). Papers come from many countries: U. S. (10), Germany (2), Canada (1), China (1), Sweden (2), India (1), Austria (1), Belgium (1), Denmark (1), Japan (1) and WMO (1), besides Finland (5), and cover many aspects of aerology, upper atmosphere fronts, jet stream structure and hydrography—all fields of prime interest to PROF. PALMÉN. A sketch of his life and work, with his portrait, precedes the other articles. He was born on Aug. 31, 1898, received his M.S. in 1921 and his Ph.D. in 1927 at the Univ. of Helsinki. He worked at the Institute for Marine Research (1922–1947) and was its Director from 1939–1947, and was a reader in geophysics at Helsinki University for 20 years and visiting professor at various universities in the U. S. since 1946. *Subject Headings:* **1. Biography of E. H. Palmén 2. Palmén, Erik H.**—*M.R.*

10.11–55 551.5:9

Schneider-Carius, K. (*Geophysikalisches Inst. der Karl-Marx-Univ., Leipzig*), **Heinrich Ficker als Synoptiker und Aerologe.** [Heinrich Ficker as a synoptician and aerologist.] *Zeitschrift für Meteorologie*, Berlin, 12(4/6):101–108, April/June **1958.** 4 refs. **DWB, DLC**—The author reviews the contribution of FICKER to synoptic meteorology and aerology. In his Innsbruck föhn studies he established the field of microsynoptics. With the aid of free balloons he investigated the aerology of föhn and the vertical structure of the atmosphere and the properties of stream lines. His study of the transport of cold air masses across the Alps was followed by the application of the same ideas to the propagation of cold waves in Russia and Siberia; here he anticipated the modern theory of cyclones. In his cyclone theory, which has not found general recognition, FICKER found that cold "polar" air currents erupt into warm "equatorial air" so that the polar front theory is anticipated. With the use of isallobars he found that the cold regions were associated with anticyclones. Depressions were considered as the effect of adjacently flowing air masses of different temperatures having a warm wave on the anterior side and a cold wave in the rear. While the separation line corresponds to the polar front FICKER has not given it dynamic importance—the polar front surface is lacking and the vertical structure of the depression is not treated. While FICKER was well acquainted with the essentials of contemporary cyclone theories he did not generalize—a task that was accomplished by the Norwegian school. FICKER's concept of the compound depression, his views on the role of low depressions, the concept of steering formulated by him, the study of the vertical displacement of the fundamental level of the trade wind in the vicinity of Tenerife etc., are discussed. *Subject Headings:* **1. Biography of Heinrich Ficker 2. Ficker, H.**—*I.L.I.*

BIBLIOGRAPHY

See also: **General circulation bibliogs.** (Pogosian), 10.11–9; **Microseism bibliogs.** (Gutenberg), 10.11–15; **Oceanog. bibliogs.,** 10.11–61.

10.11–56 551.510.42:0

†**Air Pollution Bibliography, Vol. 2,** issued Wash., D. C., **1959.** 176 p. Items 751–15.. (in continuation of Vol. 1). Ed. by Arnold J. Jacobius et al. for the Public Health Service, U. S. Dept. of Health, Education and Welfare. At head of title: Library of Congress. Science and Technology Div. Bibliography Section. (For abstract on Vol. 1, *see* 9.1–75, Jan. 195.. *MAB.*) **DLC**—This volume follows closely the arrangement, style, scope and type of abstract found in Vol. I. The subject index is cumulative for Vol. I and II. Material covers that published between 1952 and 1958 in fields of physiology, medicine, agriculture, engineering, economics, etc. and is on an international scale. Arrangement is alphabetical, by author with a "secondary author" index appended. Subject indexing is more detailed than in Vol. I. Abstracts are informative. *Subject Headings:* **1. Atmospheric pollution bibliographies 2. Bibliographies of air pollution. I. Jacobius, Arnold J.** (*ed.*) **II. Gibson, Jack R.** (*ed.*) **III. Wright, Vincent S.** (*ed.*) **IV. Culver, Wave E.** (*ed.*) **V. Kassianoff, Ludmila** (*ed.*) **VI. U. S. Library of Congress. Science and Technology Div.**—*M.R.*

PRACTICAL AND APPLIED METEOROLOGY

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Maritime Met. navigation**, 10.11–1; **Ocean-atmos. interaction, N. Atlantic**, 10.11–2; **Marine forecasting** (Zubkov), 10.11–28; **U. S. W. B. marine program** (Hoover), 10.11–52; **Ocean.-atmos. interaction** (Girs), 10.11–161; **Water temp., E. Pacific** (Knauss), 10.11–172; **Water temp., Macquarie Is.** (Loewe), 10.11–173; **Water temp.**, 10.11–174; **Sea water properties, Villefranche** (Halim), 10.11–197; **Water wave slopes** (Schooley), 10.11–198; **Wind effects on water temp.** (Berenbeim), 10.11–199; **Wind effects on shallow water** (Lauwerier), 10.11–200.

10.11–57 551.465:550.342:551.515.1

Bernard, Pierre, **Sur un cas de propagation de la houle à très grande distance.** [A case of swell propagation at very long distance.] *Académie des Sciences, Paris, Comptes Rendus*, 248(16):2370–2372, April 20, **1959.** 2 figs., 7 refs. **DWB, DLC**—A swell of cyclonic origin can be detected through its microseismic effects at coastal seismographical stations, as far as beyond the antipodes of the source. The progressive swell may be a cause of microseisms, if the disturbed zone has limited size; this condition seems fulfilled when trains of a swell, having a remote origin, pass in the vicinity of a station. The author summarizes the progression of zones of swell resulting from two atmospheric disturbances. The propagation speeds of the swell deduced from these observations are little dispersed and remain in the range of 50 to 60 km/hr; they are in good agreement with those deduced from earlier observations. *Subject Headings:* **1. Swell propagation at long distance 2. Microseismic effect on swell.**—*A. V.*

10.11–58 551.465:551.542(262)

Lacombe, Henri and Lizeray, Jean-Claude, **Sur le régime des courants dans le détroit de Gibraltar.** [Regime of currents in the Straits of Gibraltar.] *Académie des Sciences, Paris, Comptes Rendus*, 248(17):2502–2504, April 27, **1959.** 2 figs. **DWB, DLC**—Systematic measurements of current in surface and deep waters, carried out at ten stations located in the Straits of Gibraltar, have made it possible to observe the superposition of two currents having an opposite direction: ingoing current at the surface and outgoing current in depth. The flow presents large variations, their main cause lying in the distribution of atmospheric pressure over the Western Mediterranean Sea. *Subject Headings:* **1. Current regime 2. Ocean current interactions 3. Atmospheric pressure influence on currents 4. Straits of Gibraltar.**—*A. V.*

10.11–59 551.46:061.3

Lacombe, H. (*Muséum d'Histoire Naturelle*), **Compte rendu des travaux océanographiques exposés à l'Assemblée Générale de l'A.I.O.P. à Toronto.** [Report on oceanographic papers read at the Toronto General Assembly of the I.A.P.O.] *La Houille Blanche*, Grenoble, 13(A):314–322, July **1958.** 7 figs. Text in English and in French. English and French summaries p. 314. **DLC**—The author briefly describes the main points discussed in the papers presented at the General Assembly of the International Association of Physical Oceanography, held at Toronto from Sept. 3rd to 14th 1957. The first symposium, on the **Water balance sheet,** was the occasion for a joint meeting with the World Meteorological Association and, like the symposium on the **Exchange of momentum between the atmosphere and the ocean,** showed the great need for liaison between oceanographers and meteorologists since marine phenomena are largely conditioned by the energy which passes between the air and the sea. In addition to this important question, the symposia dealt with other important problems of modern physical oceanography; turbulence near the sea bed, oceanic circulation at great depths and tides in the open sea. Papers on various other oceanographical topics were also presented. *Subject Headings:* **1. Oceanography 2. International Association of Physical Oceanography, Sept. 1957, Toronto.**—*Author's abstract.*

10.11–60 551.46:77(03)

Encyclopédie Prisma du Monde Sous-Marin. [Prisma encyclopedia of the submarine world.] Ed. by J. A. Stevens, with the collaboration of the Marine Nationale et al. Paris, Editions Prisma, **1957.** 558 p. numerous figs., photos. **DLC** (GC9.E6)—A nicely illustrated

French dictionary (or small encyclopedia) of French terms used in submarine photography, marine biology and to some extent in physical oceanography. Photos emphasize submarine creatures and activities of man, equipment, etc. *Subject Headings:* **1. Submarine photography 2. Oceanography dictionaries. I. Stevens, J. A.** (*ed.*).—*M.R.*

10.11–61 551.46:016

†**Boletin Bibliografico de Geofisica y Oceanografia Americanas (B.B.G.O.A.)**, [Bibliographical Bulletin of American Geophysics and Oceanography], Vol. 1, **1958–**. Issued in Parts. Vol. 1, **Parte Geofisica,** issued Mexico, **1958.** 160 p. Vol. 1, **Parte Oceanografica,** issued Mexico **1958** (colophon June 20, 1959). 470 p. "Parte Geofisica covers Jan.–Dec. of each year. Parte Oceanografica covers July–Dec. of one year and Jan.–June of the following year." Issued by the Pan American Institute of Geography and History. Editor, Manuel Maldonado-Koerdell. Title page in Spanish, English, Portuguese and French. Articles in Spanish, English or Portuguese. **DPU**—This large compilation of news items regarding oceanographic conferences and research in the Americas during 1957– (excluding the U. S.) contains scores of abstracts and hundreds of references to articles on all phases of oceanography, arranged by countries. Alaska, Canada, Mexico, Cuba, Puerto Rico, Brazil, Uruguay, Argentina, Chile, Peru, Ecuador. Each section contains a brief history of oceanographic research in the area or country and the work conducted during IGY. *Subject Headings.* **1. Oceanographic research in America 2. Oceanographic bibliographies. I. Maldonado-Koerdell, Manuel** (*ed.*) **II. Pan American Institute of Geography and History.**—*M.R.*

HYDROLOGY AND LIMNOLOGY

See also: **Flash floods, U.S.S.R.** (Bogoliubova), 10.11–23; **Hydrological calculations** (Chebotarev, Klibashev), 10.11–34; **Pressure effects on lake water level** (Harris), 10.11–175.

10.11–62 551.482.215.2:551.482.018

Straub, Conrad P.; Ludzack, F. J.; Hagee, G. R. and Goldin, A. S. (*all, Robt. A. Taft Sanitary Eng. Center, 4676 Columbia Pkwy, Cinn., Ohio*), **Time of flow studies, Ottawa River, Lima, Ohio.** *American Geophysical Union, Transactions,* 39(3):420–426, June **1958.** 2 figs. 4 tables, 24 refs. **DLC**—Chemical (sodium chloride), colorimetric (fluorescein dye), and radioactive (rubidium^{86}) tracer techniques were used to measure the time of flow of the Ottawa River below Lima, Ohio. Two runs were made during a two-week period in August 1956 when low stream conditions prevailed. In the first run, fluorescein dye and rubidium tracer were introduced into the stream and measured at two stations located 1.0 and 1.9 mi downstream, and in the second, dye and radioactive tracers, and sodium chloride were introduced and measured at three stations located 1.0, 1.9, and 4.5 mi downstream. The results show that under existing test conditions all tracers gave similar results and the maximum deviation was generally less than 10%. The equipment and facilities needed to carry out the field and laboratory tests are described and the costs and limitations of each method are indicated. *Subject Headings:* **1. River current measurement 2. Tracer techniques in hydrology.**—*Authors' abstract.*

GLACIER ICE—SEA ICE

See: **Glacial geology** (Flint), 10.11–12; **Arctic ice islands** (Crary), 10.11–48; **Glacial data, Sweden** (Eriksson), 10.11–224; **Ice damage during winter floods** (Plashchev), 10.11–228.

GEOMAGNETISM

See also: **Geomag. disturbances-atmos. circulation relationships** (Woodbridge et al.), 10.11–154.

10.11–63 550.385:525.

Elsasser, Walter and Munk, Walter, **Geomagnetic drift and the rotation of the earth.** *International Series of Monographs on Earth Sciences,* London, Pergamon Press, Vol. 1 (Con

tributions in Geophysics in honor of Beno Gutenberg), pub. 1958. p. 228–236. 12 refs., 3 eqs. **DLC** (QE500.C6). Review by Nelson C. Steenland in *American Geophysical Union, Transactions*, 40(4):351–352, Dec. 1959.—Conclusion is that the displacement of the pole of rotation of the earth due to magnetic coupling motions in the earth's core is negligible. These variable motions account for some of the changes in the earth's period of rotation (based on data for 1890–1945). Equations are developed for Eulerian motion with a rigid core and a rigid mantle with a fluid core, to show magnitude of possible polar displacement due to these forces. Even over periods of geological time such displacement would be small. *Subject Headings:* **1. Polar displacement due to geomagnetic drift 2. Geomagnetic drift effects on earth's rotation.**—*M.R.*

10.11–64 550.38:552.43

Daly, Lucien, **Sur l'anisotropie magnétique dans les roches déformées, et la nature de leur aimantation rémanente naturelle.** [Magnetic anisotropy in metamorphic rocks and nature of their natural remanent magnetization.] *Académie des Sciences, Paris, Comptes rendus*, 248(18):2614–2616, May 4, 1959. 4 refs. **DWB, DLC**—Study of residual magnetization of metamorphic rocks for the purpose of palaeomagnetic and tectonic applications. This study concerns solely the rocks with a structure visible to the naked eye and is based on about fifty samples for which the position has been determined through E. THELLIER'S method. Measurements of intensity, orientation and direction of magnetization of these samples were made in a laboratory (THELLIER'S method). The study shows that natural remanent magnetization (N.R.M.) of metamorphic rocks, the direction of which is bound to the schistosity plane, are of a nature different from usual magnetization: viscous remanent (V.R.M.), isothermal remanent (I.R.M.), thermo-remanent (T.R.M.). These rocks present moreover a very great anisotropy of provoked remanent magnetization. *Subject Headings:* **1. Earth's magnetism 2. Palaeomagnetism 3. Magnetic anisotropy 4. Remanent magnetization.**—*A.V.*

ASTRONAUTICS—SATELLITE OBSERVATORIES

See also: **IGY satellite program**, 10.11–40.

10.11–65 551.507.362.2:551.510.3

Horn, W., **Die Dichte der Atmosphäre in grossen Höhen, bestimmt aus den Bahnverhältnissen künstlicher Satelliten.** [Density of the upper atmosphere determined from the evolution of the artificial satellite orbit.] *Die Sterne*, Leipzig, 35(1/2):41–43, 1959. **DLC**—Some anomalies in the calculations of the Sputnik and rocket orbits are mentioned. To simplify the different calculations, the author considers circles instead of ellipses; he estimates that these irregularities are not of great importance in reckoning the earth's atmospheric density. For the different calculations KEPLER'S law is used. *Subject Headings:* **1. Upper atmosphere density 2. Satellite observatories**—*A.V.*

AERONAUTICAL METEOROLOGY

See also: **Visibility** (Gavrilov), 10.11–10; **Naval aeronautical met.**, 10.11–37; **Fog dissipation** (Le Claire), 10.11–68; **Aircraft weather reconnaissance** (Roberts), 10.11–100; **Upper air winds, Darwin-Singapore air route** (Ryan), 10.11–202; **Vertical wind shear measurement** (Corwin), 10.11–206; **Contrail dissipation** (Clodman), 10.11–216; **Airport landing conditions** (Farthing), 10.11–248.

10.11–66 551.5:629.13

†U. S. National Advisory Committee for Aeronautics, **44th Annual (and final) Report, 1958, issued 1959.** 115 p. figs., photos. "Administrative reports without technical reports." Listing of Research Publications, p. 67–81. Price: $1.00 from U. S. Govt. Print. Off., Wash., D. C. (*See* 10.5–125, May 1959, *MAB*, for 1955, 56 and 57 Reports.) **DLC** (TL521.A3)—A complete and well-illustrated report on all phases of NACA research and activities in 1958, the last year of its existence before expanding into NASA. Photographs show the main NACA laboratories at the Lansing Lab., Langley Field, Va., Ames Lab. at Moffett Field, Calif., and the Lewis Flight Propulsion Laboratory at Cleveland, Ohio. History of NACA from its beginning, photos of directors and a full report on the 1955–58 period by James H. Doolittle,

chairman 1956–58. Aerodynamic research, space and satellite research, flight safety and, of course, aeronautical meteorology, icing and noise problems are given. *Subject Heading:* **1. Aeronautical meteorology.**—*M.R.*

10.11–67 551.575.1:551.576.11:551.509.325(448)

§Casanobe, G. and Lombardo, R., **Stratus côtiers et plafonds bas à Perpignan.** [Coastal stratus and low ceilings at Perpignan.] *France. Météorologie Nationale, Notice d'Instructions, Techniques*, Section 14, No. 8, Jan. **1958.** 26 p. 15 figs., 14 tables. Mimeo.—Data included in this account result from the analysis of hourly observations bearing on 10 yrs (Jan. 1947–Dec. 1956), made at the meteorological station at Perpignan (airport). This note includes two parts. The former supplies a statistical study of "low ceilings" ($h \leq 300$ m with $N_h \geq 5/8$). In 10 yrs, 290 cases of "low ceilings" with a duration less than 6 hrs, 369 cases less than 12 hrs and 23 with a duration greater than 24 hrs have been noted. The latter part is a study on stratus and fogs: frequency and diurnal and seasonal changes of stratus, analysis of stratus and fogs forecasts, influence of NE-ly winds and study of the various formation processes with the support of synoptic charts. *Subject Headings:* **1. Aeronautical climatology 2. Coastal stratus 3. Low ceilings 4. Ceiling and visibility forecasting 5. Perpignan, France.**—*A.V.*

10.11–68 551.575.1:629.13.015

Le Claire, R., **Le brouillard demeure le grand ennemi de l'aviation.** [Fog remains the great foe of aviation.] *Schweizer Aero-Revue*, Zurich, 34(6):349–350, June **1959.** fig. **DLC**—Short survey of the disturbances caused by fog in aerial navigation and description of a recent landing method used when visibility is zero. This method has been perfected by the special Blind Landing Experimental Unit. (B.L.E.U.) a division of the Royal Aircraft Establishment. A transmitter located at the end of the runway emits in the axis of the runway a beam which may be picked up by the aircraft. The signals caught present different frequencies on both sides of the axis. All along the axis itself, intensity of impulses remains unchanged and thus it is possible through the use of the automatic pilot to line up plane and runway. This is in contrast to the method used in England during the World War II which consisted in the use of gasoline burners spaced out all along the runway. *Subject Headings:* **1. Fog effects on air traffic 2. Airport landing aids 3. Fog prevention methods.**—*A.V.*

10.11–69 551.582:629.13(497.1)

§*Makjanic, Berislav, **Zrakoplovna klimatologija aerodroma Zagreb-Lučko.** [Aeronautical climatology of the Zagreb-Lučko Airport.] *Zagreb, Yugoslavia. Hidrometeorološki Zavod. Rasprave i Prikazi*, 8(3), **1959.** 112 p. 35 figs., tables, 10 refs. (M(055) C937ra)—A large monograph giving details of the climate of Lučko (45°46′N, 15°53′E, 122 m) in text, extensive tables and diagrams. Elements considered are: 1) air temperature (1949–1955)—annual and seasonal, highest and lowest, diurnal cycle; 2) humidity—relative humidity, mixing ratio and temp.-mixing ratio contingency tables for 1, 7, 13 and 19 h for each month; 3) rainfall—annual, monthly, daily, number of days, snow and wind-precipitation relationships; 4) cloudiness, visibility—diurnal and annual, days with fog, relation between fog and lapse rates of temperature and specific humidity, fog and wind, fog and temp.; 5) poor visibility, rain or snow, poor flying weather; 6) synoptic conditions and fog, case histories Dec. 19–26, 1951 and Jan. 28–Feb. 1, 1952; 7) clouds and cloud frequency; 8) wind speed and direction; 9) pressure; 10) density; 11) thunderstorms (duration, movement, thunderstorm and rainfall and thunder storms and strong winds). Scores of excellent graphs and diagrams are appended along with sample surface and synoptic charts for fog conditions. *Subject Headings:* **1. Aeronautical climatology, Zagreb Airport 2. Zagreb-Lučko Airport 3. Synoptic fog studies, Zagreb, Yugoslavia 4. Yugoslavia.**—*M.R.*

10.11–70 551.5:061:656.7 551.513.2:551.557.

McTaggart-Cowan, P. D. (*Dept. of Transport, Canada*), **Jet weather.** *Canadian Aeronautical Journal*, Ottawa, 4(4):121–125, April **1958.** 9 figs. **DLC**—Problems of jet plane dispatch control, VLR (very long range) flights, commercial jet operations and of the jet stream as concerns meteorological science, rendered by the government and by the airline companies are discussed and illustrated by sketches. The problems are of 3 kinds: 1) Com-

unications, which are complicated by the longer range and greater depth of operations into e continents. This involves duplication of forecasting information and flight advisory rvices; 2) Accuracy of meteorological information and efficiency of forecasts. These could increased by having twice as many upper air sounding stations but airlines do not know nat degree of accuracy is needed, and 3) Knowledge of the atmosphere—for example, we now now the jet stream is not a simple current but a multiple and fluctuating beam. *Subject eadings:* **1. Jet transport weather service problems 2. Jet stream.**—*M.R.*

10.11–71 551.509.51:551.575

Harrison, Henry T. (*Dir. of Met., United Air Lines*), **Forecasting sub-minimum fog at altimore Friendship Airport.** *United Air Lines, Inc., Denver, Colorado, UAL Meteorology ircular*, No. 45, Jan. 15, 1959. 33 p. 28 figs., 2 tables, 9 refs., map. Mimeo. **DWB**—A odel study of synoptic and other meteorological factors affecting fog or low visibility occurnce at Friendship International Airport, Baltimore, Md. This airport has more bad weather isibility $<\frac{1}{2}$ mi) than any other main airport in the Washington-Boston region: 139 hrs mpared with 49 hrs at Washington National Airport. Most of this occurs in the 3 winter onths. The difference is not so great for moderately bad weather (ceiling <500 ft and sibility <1 mi). Advection from Chesapeake Bay in warm front conditions and calm <6 mph) accounts for most of the occurrences. Fog wind-rose shows 76% with 0–5 mph ind and greatest for >5 mph from N.E. Most years (1940–1957) show from 4% to 8% of inter weather <500 ft and 1 mi, but 1957 had 16%. No temperature interval in any month ows any significant tendency toward fog. Forecast rules and nomograms were developed om 1954–57 sample and tested against 6 hourly surface charts for Jan.–June 1958. All told, 71 cases of 200 ft and $\frac{1}{2}$ mi or less were found and these were analyzed by season, synoptic ype, etc. Composite surface charts were made for all cases representing each of the major ypes, then frontal positions for each case in winter of 1957–8 were plotted on a composite map isually a northeasterly tendency from Appalachians to middle Atlantic Coast and then an asterly tendency out over the Atlantic). Parameters to be considered are listed, Norfolk ewpoint and ocean temperature found significant, and a nomogram prepared in which all ases outside limits did not have fog, and $\frac{3}{4}$ of those inside did. *Subject Headings:* **1. Fog orecasting studies 2. Fog frequency data 3. Friendship Airport, Baltimore, Md.**—*M.R.*

10.11–72 551.551:629.13:551.509.322.7

Harrison, Henry T., **The use of horizontal wind shear in forecasting high level clear air rbulence.** *United Air Lines, Denver, Colo., UAL Meteorology Circular*, No. 49, July 15, 1959. 2 p. 11 figs., 12 refs. **DWB**—Presentation of methods for forecasting clear air turbulence CAT) at high levels for transcontinental flights by U. A. L. in the U. S., and of applications these forecasts to flight planning by the pilots to avert or minimize severe conditions. After egative attempts at finding successful techniques, a method based on assumption that steepess of horizontal wind shear at level of occurrence is a good clear air turbulence indicator roved very useful. A sample of 76 severe CAT cases in 1957 was used to study jet stream ores and wind shear. Of these 76 cases, 74% (56) occurred to left of jet; 13% (10) to right jet; 7% (5) between 2 jets and 7% (5) in a mountain wave. Each type and specific cases epresenting all sections of the U. S. are discussed and illustrated. Rules and simple methods r forecasting are set forth and illustrated. Occurrences for Jan., Feb. and March 1959 were so included. *Subject Headings:* **1. Clear air turbulence forecasting 2. Horizontal wind shear-ear air turbulence relationships 3. Jet stream-clear air turbulence relationships 4. United tates.**—*M.R.*

AGRICULTURAL METEOROLOGY

See also: **Agric. climat.** (Brooks), 10.11–5; **Agromet.** (Molga), 10.11–8; **Cotton field microclimat.** (Zuev), 10.11–19; **Handbook of plant physiology,** 10.11–33; **Agromet. services** (Stepanov), 10.11–51.

10.11–73 551.506.2:551.5:63

Geslin, H., **Les aspects climatiques de la campagne agricole 1957–1958.** [Climatic pects of the agricultural year 1957–1958.] *Académie d'Agriculture de France, Paris, Comptes*

Rendus, 45(4):131–137, Feb. 11, 1959. 4 figs. **DLC**—Study of the influence of climati factors on the crop yield in France during the year 1957–1958, including: mean seasona climatic data and differences with respect to the normal for temperature and precipitation account of climatic evolution in the course of the seasons of agricultural year 1957–1958 Climatic year 1957–1958 was predominated through cold, rainy and not much sunny weathe observed during spring and summer. This weather accounts for the unfavorable results of th agricultural year whose main features were: poor development of grapes in the South of France during spring, mass attacks of mildew on potatoes at the end of spring and beginning of summer poor ripening of grain and deficient beet content. *Subject Headings:* **1. Agricultural meteor ology 2. Climatic influence on crop yields 3. France.**—*A. V.*

10.11–74 551.586:551.577.38:63

de Wit, C. T. (*Inst. of Biol. and Chem. Res. on Field Crops and Herbage, Wageningen Netherlands*), **Second crop growing during the dry season in Lower Burma.** *Netherland Journal of Agricultural Science*, Wageningen, 6(4):249–255, Nov. **1958.** 2 figs., 5 refs. **DA**— A study of climatic and soil conditions and some small-scale experiments showed that at leas a part of the medium-textured soils in Lower Burma may be worked in such a way as to ensur small yields of second crops. A considerable amount of water may be conserved for growin a second crop during the dry monsoon provided paddy fields are ploughed in a wet conditio directly after the rice harvest. The yield of cow peas as a second crop may be around 33 kg seed ha^{-1}, and 4000 kg ha^{-1} of cattle fodder may be obtained if such crops as sorghum ar grown. *Subject Headings:* **1. Second crops 2. Crop rotation 3. Lower Burma.**—*From author's introduction and summary.*

10.11–75 551.586:633.

Davidson, B. R. (*Eggerton Agric. Coll., Njoro, Kenya*), **The climatic limitations of sub terranean clovers in Kenya.** *East African Agricultural Journal*, Kikuyu, Kenya, 24(2):121 124, Oct. **1958.** chart, 3 tables, 3 refs. **DLC**—The detailed studies carried out by TRUMBL (1939) and AITKEN (1955) to find the exact climatic limits of varieties of *Trifolium subterraneu* are applied to the climatic data (temperature, rainfall and evaporation) of 26 centers in Kenya A chart gives the areas of Kenya climatically suitable for different varieties of subterranea clover. Most of the area is in the higher, cooler and wetter regions (April to August rainfall) with a probability of more than 15 in. of rain during this season in 8 out of 10 years. Th late and mid-season varieties will only flower and set seed at the very highest altitudes. Earl varieties have a more widespread distribution. *Subject Headings:* **1. Subterranean clove 2. Agricultural meteorology 3. Climatic limits for clover 4. Kenya.**—*A. V.*

10.11–76 551.586:635.64:635.98(423.4

Cohen, Gaston, **Guernesey et l'industrie de la tomate.** [Tomato cultivation at Guern sey.] *La Nature*, Paris, No. 3288:168–171, April **1959.** 7 figs. **DLC**—Tomato cultivatio under glass has become increasingly popular in Guernsey Island. This development is perha due to the climate which presents much more sunshine than in Great Britain. No particula care has been taken in locating greenhouses nor to their lighting. Their orientation dis regards the maximum use of sunbeams; they were principally laid out according to relie shape and extent of the parcels. The sole factor which might limit the development of th type of cultivation is water supply. *Subject Headings:* **1. Tomato cultivation 2. Greenhouse 3. Climatic influences on tomato cultivation 4. Guernsey, Channel Islands.**—*A. V.*

10.11–77 551.586:633.71:632.75:632.9

Michel, E., **Essai d'application des relevés météorologiques à l'organisation de la pro tection du tabac contre les pucerons.** [Attempt of applying meteorological data in order t organize tobacco protection from aphis.] *Académie d'Agriculture de France, Paris, Compte Rendus*, 45(9):444–447, May 6, **1959.** fig. **DLC**—The curve of differences between maximu and minimum temperatures during the lapse of active vegetation of tobacco plants supplie information on the favorable and unfavorable periods for development of plant lice. Recogni tion of the "critical difference" makes it possible to organize a fight against the aphis (*Myzu Persicâe*) which, more than all others, overruns the greatest number of plant species. *Subje*

Headings: **1. Tobacco cultivation 2. Aphis protection 3. Temperature effects on aphis control.**—*A.V.*

10.11–78 551.586:551.521.16:633.14

Listowski, Anatol, **Über den Einfluss der Jarowisation und des Kurztages auf die Entwicklung des Roggens.** [The effect of vernalization and short days on the development of rye.] *Der Züchter*, Berlin, 28(7):314–320, **1958.** fig., 5 tables, 11 refs. **DA, DLC**—Investigations were made to show the effect of periodical day shortening on Petkus and Wiatka rye after vernalization. Short days caused a decrease in the generative development. No difference was found in the reactions of both kinds of rye. The results showed some differences with previous experiences; in relation to this, some hypotheses are discussed. *Subject Headings:* **1. Rye culture 2. Vernalization 3. Photoperiodism 4. Climatic influences on rye culture.**—*A.V.*

10.11–79 551.586:633.15:632.4

†Middendorf, Maria, **Untersuchungen über Methoden zur Infektion mit Maisbrand und ihre Abhängigkeit von Alter, Temperatur und Sorte.** [Investigation on methods of infection with maize blight in relation to the age, temperature and type.] *Der Züchter*, Berlin, 28(2):80–94, **1958.** 12 figs., 26 tables, 71 refs. **DA, DLC**—Pulverization of the seeds, sprinkling of plants and hypodermal infection gave only very reduced results; the instillation method of Brefeld had no result. Temperatures between 10 and 27°C caused a remarkable diminishing of the incubation period, but did not change the infection degree. Among six kinds of maize, in open air and in greenhouse, one type only (Chiemgauer) presented a higher infection degree on the stem and the leaves. *Subject Headings:* **1. Maize cultivation 2. Maize blight 3. Temperature effect on maize blight.**—*A.V.*

FOREST METEOROLOGY

10.11–80 551.584.41:634.9

Smith, David M. (*Yale Univ. School of Forestry*), **Silviculture and micrometeorology, (1958).** 5 p. fig., refs. Presented at 2nd National Conference on Agricultural Meteorology, Oct. 23, 1958, New Haven, Conn. Mimeo. **DWB** (M84.41 S645si)—Silviculture practices involve the application of meteorological knowledge to a greater extent than agronomy, because the variety of different kinds of microclimates that can and must be created in managed forests is much wider than in fields of lower and more short-lived crops. The general discussion is illustrated by explanations and graphs showing the distribution of varying kinds of solar illumination in a north-south forest opening, the zones of "green" and "blue" shades, and direct diffuse light where forest seedlings have to germinate and grow. *Subject Headings:* **1. Silviculture 2. Forest micrometeorology.**—*A.M.P.*

10.11–81 551.586:634.9

Pardé, J., **Une notion nouvelle et fructueuse: l'indice C.V.P.** [A new and profitable idea: the C.V.P. index.] *Revue Forestière Française*, Nancy, N°. 3:195–201, March **1958.** 3 figs., 2 refs.—Analysis of S. Patterson's formula which provides a correlation between the different world climates and the corresponding forest production. This formula is based on the principle that the components having an effect on vegetation vigor are: heat, moisture, duration of the period of vegetation and intensity of the solar radiations. It is expressed as follows:

$$I = \frac{\text{Tv.P.G.E.}}{\text{Ta.12.100}}$$

where I = C.V.P. index (C = climate; V = vegetation; P = productivity), T_v = monthly mean temperature of the warmest month, T_a = difference between the monthly mean temperature of the warmest month and that of the coldest month, P = annual mean raininess, G = duration of the period of vegetation, expressed in months, $E = \frac{100\ \text{Rp}}{\text{Rs}}$ (Rp = radiation at the pole and Rs = radiation at the considered station, expressed in 10^3 cal. gram. per cm^2 and per minute). The author is of the opinion that changes should have to be made in the G and E factors.

Subject Headings: **1. Climatic influences on forest production 2. C.V.P. index. I. Patterson, S** —*A.V.*

10.11–82 582.47:551.521.1

Roussel, L., **L'activité photosynthétique des résineux pendant la mauvaise saison** [Photosynthetic activity of conifers during the bad season.] *Revue Forestière Françaises* Nancy, N°. 3:218–223, March **1959.** 2 photos.—Survey of studies relating to the photo synthetic activity of conifers during the bad season. Author considers that photosynthes of conifers still occurs at a temperature definitely lower than 0°C and that in high mountai plantations pine trees still make use of the autumn sunlight. *Subject Headings:* **1. Conif cultivation 2. Photosynthetic activity of conifers.**—*A.V.*

10.11–83 551.579:582.62

Pourtet, Jean and Turpin, Paul, **L'influence de la profondeur du plan d'eau et du trava du sol sur la croissance des peupliers.** [Influence of the depth of the watertable and of t tilling of soil on the growth of poplars.] *Revue Forestière Française*, Nancy, No. 6:415–42 June **1958.** 2 figs.—Experiments made in a poplar plantation at Vineuil (France) prove that poplars react strongly to relatively small variations of the watertable. Authors sho that the traditional methods of poplar cultivation in France are valid when the watertab remains relatively near to the surface, even during the dry season (1 m to 1.50 m approx but other methods (deep plantation, surface tilling of soil) must be used when the watertab goes down considerably in summer. *Subject Headings:* **1. Poplar cultivation 2. Watertab influences.**—*A.V.*

INDUSTRIAL METEOROLOGY

See also: **Wind produced energy** (Frenkiel, Zacks), 10.11–189; **Wind force on marine oil drilling installations** (Goptarev), 10.11–191.

10.11–84 551.590.21:551.577:635.

*Misner, E. G., **Sunspots, rainfall and the price of cotton.** *Cornell Univ. Dept. of Agr cultural Economics*, [*Publication*] A. E. 1070, Aug. **1957.** 19 p. 3 figs., 8 tables. **DW** (633.51 M678su)—Results of a study of 67 years of precipitation, temperature and cr statistics (1889 to 1955), including a study of sunspot numbers for the 6 cyclic periods. graph shows comparison of average position in the 6 cycles and May–July rainfall one ye later at 25 stations in the cotton belt (percentage of normal). A rough relationship w deduced (110% of normal for maximum sunspot period and 88% of normal for 6 years followi minimum spotting). A graph shows trends in price of December cotton futures from Augu to December in 41 dry and in 24 wet years (1895–1955). Prices went down from a high val in dry years and up in wet years from a low value. *Subject Headings:* **1. Sunspot-rainf relationships 2. Sunspot-cotton crop relationships 3. Cotton Belt, U. S.**—*M.R.*

10.11–85 551.578.46:621.315.

Shoda, Mikio (*Japanese Natl. Railways, Railway Technical Res. Inst.*), **Snow-proof co dition and safety-factor of the leg structure of steel tower under snow cover (rationalizati of the snow-proof construction).** *Seppyo* (*Snow and Ice*), Tokyo, 18(3):83–90, Oct. 195 3 figs., table, eqs. In Japanese; English summary p. 83–84. **DWB**—Results of a study damage to steel towers of transmission lines buried in snow, wherein 1357 beams were vestigated. For a given tower or beam whose height is less than the snow depth, there i critical boundary value where damage will or will not be done. The various factors a formulated in detail, and examples given and illustrated. *Subject Headings:* **1. Snow damage steel towers 2. Transmission lines 3. Japan.**—*M.R.*

MEDICAL METEOROLOGY

10.11–86 551.5:616.2

†Daubert, K., **Medizin-meteorologische Studie über das Asthma bronchiale.** [Medi meteorological studies on bronchial asthma.] *Meteorologische Rundschau*, Berlin, 11(6):10

178, Nov./Dec. 1958. 16 figs., 4 tables, 80 refs. German summary p. 169. **DWB, DLC**—The atmospheric stimuli associated with attacks of asthma are analyzed on the basis of 1000 cases of asthmatics from Tübingen and its vicinity. The daily frequency of asthma attacks shows a maximum between 0 and 6 o'clock and is probably of endogenous parasympathetic origin. The annual frequency of asthma attacks varies from country to country and year to year. In the Tübingen area the highest frequency was in the winter months with a secondary maximum in summer. Atmospheric aerosols with a diameter of 0.2–0.5μ to 3–5μ are important in asthma production. Alkalizing substances, organic dusts, etc. are associated with asthma attacks. Pollen and spores may actually act as sensitizing agents for asthma attacks brought on by other factors such as disease of the autonomic nervous system, weather processes, etc. Statistical data are presented indicating that abnormally high temperature and vapor pressure are associated with a greater than random incidence of asthma attacks; low temperature and high cooling rate do not show such a relationship. The relationship between dynamic weather types (established on the basis of regulation of surface weather elements and prevailing tropospheric processes) and asthma attacks was examined and it was found that asthma attacks are generally less frequent during anticyclonic fair weather than during bad weather, especially during cyclonic peaks where a rapid transition from advective warm to cold weather takes place. In the case of dynamic processes in the free atmosphere, it is shown that asthma attacks occur predominantly during upglide of subtropical warm air and during turbulence of advancing cold air. The results of 12 to 24 hr forecasts of asthma attacks, classified as weak or none and moderate to severe meteorotropic effects, indicate that a comparison of actual and predicted number reaches almost a significance of 30. Also the climatic therapy of asthma is discussed. *Subject Headings:* **1. Weather effects on asthma 2. Asthma 3. Tübingen, Germany.**—*I.L.D.*

10.11–87 615.37:616.2

Cohn, M. L.; Davis, C. L. and Middlebrook, G. (*all, Univ. of Colorado School of Medicine*), **Airborne immunization against tuberculosis.** *Science*, N. Y., 128(3334):1282–1283, Nov. 21, **1958.** table, 8 refs. **DLC**—Inhalation of very small numbers of living attenuated (BCG) organisms and their multiplication in guinea pigs results in the development of acquired resistance against subsequent airborne infection with virulent tubercle bacilli. Different strains of BCG have differing capacities to immunize by this means. *Subject Headings:* **1. Air-borne immunization 2. Tuberculosis.**—*Authors' abstract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Climatic data presentation** (Landsberg), 10.11–16; **Radar weather obs.** (Henderson et al.), 10.11–17; **Data processing,** 10.11–35; **Heated psychrometer accuracy** (Kachurin), 10.11–115; **Radar obs. of cloud structure** (Salamonik), 10.11–217.

10.11–88 551.501.75:551.55(437.1)

Křivský, Ladislav (*Ondrejov, Prague*), **Bestimmung der vorherrschenden Windrichtung aus Windfahnenbäumen.** [Determination of the prevailing wind direction from "wind vane" trees.] *Meteorologische Rundschau*, Berlin, 11(3):86–90, May/June **1958.** 9 figs. (incl. photos), 7 refs., eqs. **DWB, DLC**—The author investigates the method of determining the prevailing wind direction by means of "wind vane" trees by comparing the measured prevailing wind directions at the Donnersberg Observatory (Bohemia) with the direction acquired by spruce and larch "wind vane" trees growing in the immediate vicinity of the observatory. The physical geography and climatic exposition of the Donnersberg, the wind conditions and the method for determining the prevailing wind direction by means of "wind vane" trees are described and the results of measurements of wind direction from "wind vane" trees and from wind roses are presented. The prevailing wind direction as given by the former is between 286° and 288° while that given by the latter is 284° so that there is practically complete agreement. The spruces gave a mean direction of 284° which was raised to 290° by weighting; the larches gave a mean direction of 284° which resulted in 285° by weighting. Photographs

and diagrams of "wind vane" trees, and wind rose data are presented. *Subject Heading* **1. Wind measurement techniques 2. "Wind vane" trees 3. Milešovka Observatory, Czecho slovakia.**—*I.L.D.*

10.11–89 551.501.74:551.508.4

Terrien, Jean (*Int. Bur. of Weights and Measures, Sèvres*), **Méthodes optiques pou mesurer la hauteur de mercure d'un manomètre; nouveau manomètre interférentiel.** [Optic methods for measuring the height of mercury in a manometer; new interferential manometer *Revue d'Optique*, Paris, 38(1):29–37, Jan. **1959.** 7 figs., 7 refs. French and English summari p. 29. **DLC**—Various optical processes either geometrical or interferential are described f the localization of mercury surfaces in a manometer or a barometer and applied to the measur ment of the vertical interspace between two such surfaces. Among the new processes t last one received attention because of its simplicity, rapidity and accuracy of reading. Inte ferences are suitable for determining the equality of two optical paths using fringes in whi color and reading the manometrical height on a graduated scale. The initial reading is check through use of a mercury flat enabling the manometer to be kept under pressure. *Subje Headings:* **1. Interferential manometers 2. Optical methods of manometry.**—*Author abstract.*

10.11–90 551.501.1(02)(28

Canada. Meteorological Division, **Instructions for making shipboard weather observ tions on the Great Lakes.** Its *CIR*-2878, OBS-260, Feb. 14, **1957.** 25 p. 9 figs., 2 table **DWB** (M(06) C212c)—Instruction manual, in outline form, covers codes, landmarks, vi bility, weather, wind speed and direction, equipment and aids and examples of coded repo of weather information available to mariners on the Great Lakes. *Subject Headings:* **1. Gre Lakes meteorological observations 2. Marine meteorological observation manuals 3. Gre Lakes 4. Canada.**—*M.R.*

10.11–91 551.501.1:551.500

*Lettau, Heinz H. (*Geophysics Research Directorate*), **Scheduling of observations: rema on data presentation and tabular summary of available data (of the Great Plains Turbulen Field Program).** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmospher first mile.** N. Y., Pergamon Press, **1957.** Vol. 2:390–395. 2 tables.) **DWB**—The aut discusses criteria of general observation periods—days with approximately zero advecti steady pressure gradient conditions, mean geostrophic wind speed during the day varies fr one to the next observation period; selection of general observation days; and data presentati Tables giving the summary of measurements and available data in Vol. 2 and in Vol. 1 presented. *Subject Headings:* **1. Observational data 2. Graphical presentation 3. Obser tion schedules 4. Great Plains Turbulence Field Program.**—*I.L.D.*

10.11–92 551.501.3:551.524:551

Kosiba, Aleksander, **O konieczności ujednostajnienia skali miedzynarodowej pods wowych kryteriów termicznych w klimatologii.** [Need for an international scale of fun mental thermal criteria in climatology.] *Przegląd Geofizyczny*, Warsaw, 3(11):27–31, 19 3 tables. English summary p. 30–31. **DWB, DLC**—The author deplores the lack of unifo or standardized international weather criteria in the studies of climate in general, and especia of fundamental thermal criteria which would greatly facilitate international climatologi studies. He gives examples of discrepancies in thermal characteristics of seasons, and propo the recognition and introduction for general use of his own scale of thermal characteris (Table 2, p. 28) based on temperature values of a day or of a longer period (for the temper zone). He adds that it would be also very useful to compute other climatological eleme especially precipitation within proper thermal seasons. *Subject Heading:* **1. Internatio temperature scale.**—*A.M.P.*

10.11–93 551.501.4:551.52

Cook Research Laboratories, Skokie, Ill., **Study of the usefulness of unitary differen notation for storing and utilizing meteorological data.** Contract AF 19(604)-1108, Scient Report SR 62-2, Final Report, July 31, **1957.** 51 p. 24 figs. (incl. photos), 3 refs., eq

Radiosonde records for an Arctic station (Pt. Barrow, Alaska) for July 1953 to June 1954 are transcribed by the incremental data recording technique onto monthly time sections to show the degree of accuracy and the pictorial value of the system for transcribing, storing and retrieving observational data. The form used is designed especially for upper air temperature data and may be used either for visual or automatic interpretation. The tabular converter and the interpalate units are described and illustrated in detail. *Subject Headings:* **1. Unitary differential notation 2. Upper air temperature data presentation 3. Data processing 4. Pt. Barrow, Alaska.**—*M.R.*

10.11–94 551.501.4:551.501.8

Gavens, H. (*Main station, Toulon*), **Système mécanique d'utilisation des trois données du radar.** [Mechanical utilization system of three point radar data.] *La Météorologie*, Paris, Ser. 4, No. 51:223–225, July/Sept. **1958.** fig. **DWB**—Construction of a slide-rule, which permits the analysis of wind measurements carried out by radar. The author describes the slide-rule and gives its working principle and its use in analysis. Comparison of measurements made with this system and those obtained during clear sky with a Zeiss theodolite shows that the divergence never exceeded 3 to 4 kn for the speed and 10° for direction. *Subject Headings:* **1. Upper air wind measurement techniques 2. Radar observation techniques.**—*A.V.*

10.11–95 551.501.4

†Landsberg, Helmut E., **Data processing in geophysics.** *International Series of Monographs on Earth Sciences*, London, Pergamon Press, Vol. 1 (Contributions in Geophysics in honor of Beno Gutenburg), pub. **1958.** p. 210–227. 68 refs. **DLC** (QE500.C6). Review by Nelson C. Steenland in *American Geophysical Union, Transactions*, 40(4):351–352, Dec. **1959.**—Manual, early machine, and computer methods for processing geophysical data such as are coming in a flood to data centers during IGY, some of the requirements for solving geophysical problems, and use of machines in meteorology, oceanography, geodesy, etc. from earliest times to the IBM704 and FOSDIC (Film Optical Sensity Device for Input to Computers) are reviewed. A table gives a dozen types of problems which can be readily solved by automatic numerical procedures. An excellent bibliography on the subject documents the text. *Subject Headings:* **1. Data processing 2. Electronic computer applications 3. Statistical methods in geophysics 4. Geophysical data processing.**—*M.R.*

10.11–96 551.501.4:551.551

Stewart, Robert M., Jr.; Carson, James E.; Richardson, Glen A. and Evans, Walter H., **Research directed toward the application of recording, tabulating and analyzing techniques developed for high frequency fluctuation studies of the scale of turbulence in the boundary layer.** Iowa. State College. Physics Dept., Contract AF 19(604)-1042, Final Report, April 15, **1958.** 16 p. 5 refs., eqs.—This report represents the final summary of the activities under Contract No. AF 19(604)-1042. It begins by setting forth the objectives specified in the **statement of work** and then attempts to show how, as evidenced by the various publications and activities of the project, these objectives were attained. The basic objectives were as follows: (a) to develop a data processing system suitable for the analysis and reduction of atmospheric high-frequency fluctuation data, (b) to process the field data gathered by cooperating institutions operating under the same sponsorship, (c) to analyze the spectral and scale data, computed by the Geophysical Research Directorate from the processed data supplied under (b) above, in terms of atmospheric stability, mean wind speed, and energy budget factors. A careful design study was made to determine the optimum system for the utilization of the available type of field data. Particular care was paid to the problem of efficient reduction of the data to the most useful form for immediate use or for further processing. Error studies were made on each proposed system element to insure an ultimate over-all system precision which would be compatible with the original data. An extensive program of testing was carried out after the data processing system was constructed to guarantee that the desired level of precision was being maintained. The major test and use of the data processing system came in the reduction of the fluctuation data taken at O'Neill, Nebr., during "Project Prairie Grass," held during the summer of 1956. The scale studies to be made under this contract are not complete because the analysis is statistical in nature and not enough of the

Prairie Grass runs have undergone final reduction and been returned to this activity for analysi
A description of the method of scale analysis is herein contained. The scale study work
being continued under Contract AF 19(604)-2661. *Subject Headings:* **1. Turbulence analys
2. Boundary layer turbulence 3. Project Prairie Grass.**—*Authors' abstract.*

10.11–97 551.501.42:551.524(42

*Birkeland, B. J., **Homogenisierung der Temperaturreihe Greenwich 1763–1840.** [Homo
enization of the temperature series at Greenwich 1763–1840.] *Geofysiske Publikasjon
Oslo, 20(1), Aug. **1957.** 17 p. tables, refs. **DLC**—The author describes methods employ
to render homogeneous old temperature series and uses the method of parallelism of series
neighboring stations to homogenize the Greenwich 1763–1850 temperature series. Te
perature series from stations close to Greenwich (data of BUCHAN, GLAISHER, etc.) are availal
so that the annual variation of normal temperature is approximately the same while the norm
annual mean differs somewhat depending upon position of the station, elevation above sea lev
etc. Hence the deviations from the normal are not compiled; instead the temperatures the
selves are used after every partial series is provided with a constant correction obtained
comparing the annual mean with the simultaneous mean for Edinburgh and the Netherlan
The temperatures of the partial series were corrected for 24-hour means by the formulas

$$t_m = t_8 + c_2(t_{14} - t_8) \qquad \text{or} \qquad t_m = t_8 + c_3(t_{15} - t_8)$$

and for homogeneity the formulas $\Delta = \frac{1}{2}(\Delta E + \Delta N)$ and $t_m - \Delta \sim t$-normal were used. T
deviation of the mean for 1901–1930 for Edinburgh was used as a control. Tables are p
sented giving the series of 24 hour mean values (without homogeneity correction) for Lon
(1764–1772), Kennington (1771–1774), Muswell Hill (1774–1782), Sion House (1782–182
Lyndon (1771–1798), London, Somerset House (1774–1843), London, Greenwich Observat
(1814–1841), Southwick (1727–1739); the homogeneous temperature for Greenwich (17
1840) and five year means of this temperature series. *Subject Headings:* **1. Homogeneity
data records 2. Temperature data 3. Greenwich, Eng.**—*I.L.D.*

10.11–98 551.501.7:551.509.

§Kochanski, Adam (*Hdq. Air Weather Service, Wash., D. C.*), **Synoptic models of thickn
and isotherms.** *American Meteorological Society, Bulletin*, 38(6):347–352, June **1957.** 3 fi
table, 9 refs. **DWB, DLC**—Models of daily thickness patterns were developed for the lay
500–300 mb, 300–200 mb and 200–100 mb. Isotherm models are also given for the 300-, 2
and 100-mb levels. The models apply to an idealized wave-pattern and show the substan
difference between conditions over contour troughs and those over contour ridges. Tro
spheric-type patterns (cold troughs, warm ridges) are predominant in the 500–300 mb la
while stratospheric patterns (warm troughs, cold ridges) prevail in the 200–100 mb layer.
300–200 mb layer shows a mixed tropospheric and stratospheric type. The presented mo
are only tentative as limited data were available for their construction. The use of mo
in analysis and forecasting is discussed. *Subject Headings:* **1. Thickness pattern mo
2. Isotherm models 3. Synoptic forecasting.**—*Author's abstract.*

10.11–99 551.501.7

Pédelaborde, Pierre, **Etude des techniques actuelles et des buts de l'aérologie.** [St
of the present techniques and aims of aerology.] *Annales de Géographie*, Paris, 67(364):3
566, Nov./Dec. **1958.** 2 refs. **DLC**—This article begins with a short historical account of
principal techniques in aerology (mounted balloon, sounding balloon, pilot balloon, radioso
aircraft, meteorological rocket, rocket sounding, radar, etc.). Author mentions the esse
aims of this science and recalls some recent decisions concerning terminology of the atmosp
Subject Headings: **1. Aerology 2. History of aerology techniques 3. Terminology.**—*A. V*

10.11–100 551.501.7:551.507

Roberts, Chris, **Weather reporting—by air.** *Interavia*, Geneva, 9(4):230–231, 1
photos. **DWB**—The U. S. Air Weather Service weather reconnaissance reporting syste
described and its activities illustrated. Six weather reconnaissance squadrons are oper
in areas where manned or automatic stations are not practicable. Each squadron has 8 B

B-29 aircraft especially equipped for dropsonde release and equipped with other devices but with all guns and bomb racks, etc. removed. The flight crew consists of 12, with 3 or 4 meteorologists or technicians. Daily flights are maintained over fixed routes (Petrel, Lark, Ptarmigan, Gull, Vulture, etc.). Flights are made at 15,000 ft and dropsondes are released and reports transmitted at the same spot at the same time each day. Hurricane reconnaissance tracks are especially difficult assignments requiring special training. New equipment is expected to replace "tired" wartime B-29's. *Subject Headings:* **1. Aircraft weather reconnaissance systems 2. Dropsondes.**—*M.R.*

10.11–101 551.501.724:551.524.36

Sudakevich, Iu. E., **Ob utochnenii metodiki izmereniia minimal'noĭ temperatury.** [A more precise method of measuring minimum temperature.] *Meteorologiia i Gidrologiia*, No. 1:45–46, Jan. **1957.** fig. **DWB, DLC**—By means of several specific examples, the author shows that existing methods for recording minimum temperature involving measurements within the instrument shelter do not give the actual minimum temperature at the ground level in the plant habitat. A graph of the distribution of minimum air temperature with height according to given observations (1) at the soil surface and in the instrument shelter and (2) at the soil surface in the shelter and at a height of 2 cm is included. A minimum thermometer should be placed at a height of 2 cm above the soil surface in order to obtain the true minimum temperature. *Subject Headings:* **1. Micrometeorological temperature measurement 2. Minimum temperature measurement 3. Thermometer screens.**—*I.L.D.*

OBSERVATIONAL DATA

See also: **Radiosonde data verification,** 10.11–36; **IGY geophysics program** (Veĭtsman, Gal'perin), 10.11–38; **IGY program,** 10.11–39; **IGY satellite program,** 10.11–40; **Brit. participation in IGY,** 10.11–41; **Atmos. elec. measurement during IGY** (Israël), 10.11–257; **IGY aurora program** (Clark, Romick), 10.11–266.

10.11–102 551.506.1(675)

†*Belgium. Comité Hydrographique du Bassin Congolais, **Annuaire hydrologique du Congo Belge et du Ruanda-Urundi** [Hydrological yearbook of the Belgian Congo and of Ruanda-Urundi], **1956.** Its *Publication*, No. 11, April **1957.** 469 p. numerous tables, refs. No. 136–151. "**Annuaire** first issued for 1951. Previous data in its **Observations 1948–1950,** issued 1951." Its issue for **1957.** *Ibid.*, No. 12, **1958.** 503 p. figs., tables, refs. Also: *Annuaire hydrologique* · · · **1958.** *Académie Royale des Sciences Coloniales, Classe des Sciences Techniques, Mémoires* in 8°, N. S., 11(1), **1959.** 539 p. figs., tables, refs. **DWB** (M79 B429p)—Extensive tables of daily river and lake gage data, with graphs for each of scores of stations in the Belgian Congo. Other river and hydrological data are also included. *Subject Headings:* **1. Hydrology yearbooks 2. River stage data 3. Belgian Congo. I. Devroey, E. J.** (*comp.*). —*M.R.*

10.11–103 551.506.1(493)

*Belgium. Institut Royal Météorologique, **Annuaire Climatologique.** [Climatological yearbook], **1956.** *Belgium. Institut Royal Météorologique, Publications, Série A*, No. 6, **1957.** Also its issue for **1957.** *Ibid.*, No. 9, **1959.** 2 pieces (94 p. each), chart, almost entirely tables. **DLC**—This yearbook consists of two parts. The first contains the monthly data on the principal meteorological factors of 6 synoptic stations and the pluviometric data from about fifty stations spread over the different natural regions of the country. The second part contains the daily hour-values or daily two-hour values of the principal meteorological factors for Uccle. *Subject Headings:* **1. Climatological yearbooks 2. Belgium.**—*A.V.*

10.11–104 551.506.1(672)

*French Equatorial Africa. Service Météorologique, **Résumé mensuel du temps en A. E. F.** [Monthly review of weather in French Equatorial Africa.] Jan. **1957.** 8 p. map. Mostly tables. **DWB**—Besides a verbal summary of the weather of the month, daily maximum and minimum temperatures for 18 stations, usual temperature, relative humidity, vapor pressure, evaporation, sunshine, cloud cover, precipitation, wind and weather data for 48

stations grouped under Tchad, Oubangi-Chari, Moyen-Congo and Gabon; daily precipitatic for 36 stations and monthly precipitation for >140 stations (also charted on 2 isohyetal isarithm charts), winds aloft at 1500, 3000 and 5000 m at 12 stations and radiosonde data Bangui for 05 h each day; frequency of surface winds at 6 synoptic hours (16 directions) ar of visibilities, heights of low clouds (broken and overcast, respectively). *Subject Heading* **1. Monthly meteorological data summaries 2. Radiosonde data 3. Upper air wind da 4. French Equatorial Africa.**—*M.R.*

10.11–105 551.506.1(677.

*French Somaliland. Service Météorologique, **Résumé mensuel du temps, Nov.–De 1954.** [Monthly weather review, Nov.–Dec. 1954.] Djibouti, [1955?]. 2 pieces, unpage about 10 p. each. mostly tables.—The main synoptic conditions during the month ar consequent weather, daily precipitation at 9 stations, temperature (maximum and minimun at 5 stations, sunshine duration at Djibouti, and a summary of the chief elements, includi anomalies of temperature and precipitation, and averages and extremes of wind, relati humidity, vapor pressure, evaporation, cloudiness and number of days with thunder, lightnin haze, dust, gales, fog, etc. for 5 stations making observations at 06, 12 and 18 h. Daily win aloft at 1.5, 3.0 and 5.0 km are given for Djibouti. Rainfall, departures from normal a number of days with rain are given for 11 stations as well as pressure and soil temperatures (and 0.6 m depth), wind (16 directions), visibility and cloud height. Data are included f Djibouti and Djibouti Airport. *Subject Headings:* **1. Monthly meteorological data summari 2. Upper air wind data 3. Soil temperature data 4. French Somaliland 5. Djibouti, Fren Somaliland.**—*M.R.*

10.11–106 551.506.1(67

*Institut National pour l'Etude Agronomique du Congo Belge, **Bulletin Climatologiq Annuel du Congo Belge et du Ruanda-Urundi** [Annual climatological bulletin of the Belgi Congo and Ruanda-Urundi], **1956.** Its *Bureau Climatologique, Communication*, No. 15, pu **1957.** 181 p. Almost entirely tables. Also its issue for **1957.** *Ibid.*, No. 16, pub. 19 171 p. Almost entirely tables. And its issue for **1958.** *Ibid.*, No. 18, pub. **1959.** 189 Almost entirely tables. **DLC**—Extensive tables of climatic data for entire network, simi to 1954 and 1955 annuals (*see* 8.4–98, April 1957, *MAB*). *Subject Headings:* **1. Annual m teorological data summaries 2. Belgian Congo.**—*M.R.*

INSTRUMENT CARRIERS

See also: **IGY satellite program,** 10.11–40; **Satellite obs. of upper atmos. density** (Horn), 10.11–65; **Aircraft weather reconnaissance** (Roberts), 10.11–100; **Aircraft res. in cloud physics** (Durbin), 10.11–211.

10.11–107 551.507.321.2:551.557.2(2

Drouilhet, P. R. (*Office of Chief of Naval Operations, Navy Dept., Wash., D. C.*), **Tran sonde balloons flying on a routine basis.** *American Meteorological Society, Bulletin*, 39(2): 97, Feb. **1958.** table. **DWB, DLC**—The Navy's transosonde went into routine opera in the fall of 1957. Each day, weather permitting, a transosonde flight is launched f Iwakumi, Japan to gather weather data over the Pacific, Continental United States and Atlantic. The flight consists of a plastic balloon set to float at 30,000 ft and equipped wit aneroid barometer, a radio transmitter, batteries, ballast and ballast control equipment. flight may last from 5 to 7 days; each two hours the balloon broadcasts its identifying sym and the measured pressure. A table is presented giving some of the flight durations termination points and an explanation of the code symbols. *Subject Headings:* **1. Transoso trajectories 2. Constant level balloon flights 3. Pacific Ocean 4. United States 5. Atla Ocean.**—*I.L.D.*

10.11–108 551.507.321.2:551.557.2(2

Angell, J. K. (*U. S. W. B.*), **An analysis of routine 300-mb. transosonde flights from Ja** *Monthly Weather Review*, Wash., D. C., 86(9):335–343, Sept. **1958.** 8 figs., 4 tables, 4 **DWB, DLC**—Routine Navy-sponsored 300 mb transosonde flights from Japan for the mo

Sept. 1957–Feb. 1958 are analyzed. Statistics on the wind velocity, acceleration, and power spectra for the flights are indicated. With the aid of radiosonde data, the mean vertical motions and mean horizontal divergences along the flights are evaluated. Comparisons of transosonde velocities with geostrophic velocities obtained from National Weather Analysis Center maps are presented. *Subject Headings:* **1. Transosondes 2. Constant level balloon flights 3. Upper air data 4. North Pacific Ocean.**—*Author's abstract.*

10.11–109 551.507.362.1

First deep space probe. *American Geophysical Union, Transactions*, 39(6):1230–1231, Dec. 1958. fig. **DWB, DLC**—A 88.1 ft four-stage rocket weighing about 106,600 lbs was launched into deep space on Oct. 11, 1958 at 3:42 p.m. EST from Cape Canaveral, Fla. The probe was launched by the Air Force Ballistic Missile Division. It developed about 150,000 lbs thrust. Its payload characteristics, instrumentation and tracking are discussed. *Subject Headings:* **1. Rockets 2. Astronautics 3. Cape Canaveral, Fla.**—*N.N.*

10.11–110 551.507.362.1:551.508.59:551.557

Cline, Dudley E., **Rocket-beacon wind-sensing system.** *U. S. Signal Engineering Lab., Ft. Monmouth, N. J., Engineering Report*, E-1205, June 14, **1957.** 20 p. 19 graphs, 2 tables, 8 refs., 18 eqs. **DWB** (M08.5 C641ro)—From the spring of 1956 to the summer of 1957 the meteorological branch of the Evans Signal Laboratory, Belmar, N. J., conducted a series of tests based on the theoretical factors involved in the development of a wind-sensing system, utilizing a rocket to carry into the air a beacon-parachute combination. This program aims at obtaining upper wind data. A description of the project is given. The B-P system used is carried to 200,000 ft and released to follow the wind fields from such a height to an altitude of 100,000 ft. *Subject Headings:* **1. Rocket-borne wind instruments 2. Upper atmosphere wind measurement techniques.**—*N.N.*

10.11–111 551.507.362.1:621.397

Harris, F. H. (*Electron Tubes Branch Electronics Div.*) and Ainsworth, J. (*Rocket Sonde Branch Atmosphere and Astrophysics Div.*), **Single-line-scan television for spinning rockets.** *U. S. Naval Research Laboratory, NRL Report* 5168; Upper Atmosphere Research Report No. 33, Aerobee-Hi Report No. 6, Aug. 11, **1958.** 12 p. 10 figs., 2 tables, 9 refs., 4 eqs. **DWB** (M11 U58u)—A brief experimental and theoretical study was made of the practicability of using a vidicon camera tube to measure the space orientation of spin stabilized Aerobee-Hi research rockets. The usual television camera tube xy scan was replaced by a single-line y scan and the motion of the image obtained by rotation of the television camera was used in lieu of the x scan. While ordinary television pictures are badly blurred by camera rotation, laboratory photographs which were obtained by means of a spinning, line scan camera demonstrated that this method can be used to obtain pictures whose quality is similar to those of standard television. Design equations for determining the sensitivity and resolution of a vidicon camera tube with single-line scan were derived and verified experimentally. It is concluded that with the use of a single-line scan, satisfactory sensitivity and resolution can be obtained with compact lightweight equipment, low power consumption, simplified circuitry, and reduced transmission bandwidth. *Subject Heading:* **1. Aerobee rocket television instrumentation.**—*Authors' abstract.*

INSTRUMENTS

See also: **Radiosonde data verification,** 10.11–36; **Interferential manometers** (Terrian), 10.11–89; **Rocket-borne wind instruments** (Cline), 10.11–110; **Instruments for cloud physics research** (Durbin), 10.11–211; **Auroral photography** (Elvey), 10.11–267.

10.11–112 551.508.43:551.541

Buben, Jiří (*Geophys. Inst., Charles Univ., Prague*), **Luftdruck-Mikrovariograph.** [Air pressure microvariograph.] *Studia Geophysica et Geodaetica*, Prague, 2(1):80–85, **1958.** 4 figs., 7 refs., éq. Summary in Russian. **DWB**—The author describes the theory and construction of an atmospheric pressure microvariograph which can record absolute variations of atmospheric pressure with time. The oscillation of atmospheric pressure, P, produces air

flow in a tube connected to a vessel having a volume of 1.8×10^5 cm³. The velocity of th flow, which is directly proportional to dp/dt, is recorded by means of a galvanometer with th aid of a thermal anemometer and a Wheatstone bridge. The sensitivity in the case of a quas stationary value $|dp/dt|$ is equal to 2μ bar./sec (1 mm deviation); it may be increased to 1.5 bar. sec^{-1}/1 mm. The stability of the apparatus under the influence of temperature fluctua tions and air currents in the vicinity of the apparatus is discussed. *Subject Headings:* **1. Micro barographs 2. Pressure oscillation measurement techniques.**—*Transl. of Russian summar & I.L.D.*

10.11–113 551.508.43:526

Camps, F. (*Univ. de Liége*), **Etude du baromètre anéroïde "Barolux."** [Study of th aneroid barometer "Barolux."] *Société Royale des Sciences de Liége, Bulletin*, 26(6):295–29 June **1957.** 3 figs.—Barometric levelling can only give good results if the constants of th instruments are known. The laboratory of photogrammetry at the University of Liége equipped with the apparatus necessary to test barometers. The article describes this equi ment and gives the results obtained in the case of a particular Fuess barometer—the "Bar lux." *Subject Headings:* **1. Aneroid barometers 2. Barometric levelling.**—*A.V.*

10.11–114 551.508.

Brown, John A. and Pybus, Emmett, **Balloon borne dewpoint hygrometer flight No. BB- U. S. Proving Ground, Aberdeen, Md., Technical Note**, No. 1204, July **1958.** 25 p. 8 fig 11 refs. **DWB** (M08.71 U585ba)—Preliminary results of a balloon flight aimed at testing t New York University dewpoint hygrometer as to 1) amount of ground preparation needed f launching; 2) reliability of apparatus during launching and flight; and 3) accuracy of dat The instrument proved unsatisfactory above 28,000 ft, but it is believed that the observ lack of sensitivity could be corrected. *Subject Headings:* **1. Dew point hygrometers 2. A borne instruments.**—*G.T.*

10.11–115 551.508.71:551.501.7

Kachurin, L. G., **O tochnosti "podogrevaemogo psikhrometra."** [Accuracy of the heat psychrometer.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:53–54, **1958.** table, 2 ref 6 eqs. **DWB, DLC**—It is known that the instrumental error in measurements of atmosphe humidity is reduced as the air temperature enveloping the thermometer is raised. He preliminary heating of the air would increase the accuracy of measurement of vapor tension isobarically heated air and also the equivalent vapor tension of the air to be investigat The experimental analysis of the method involving measurement of water vapor tension various air temperatures with a heated psychrometer shows that the relative error in va tension increases with diminishing water vapor tension at low air temperatures even wh psychrometric measurements are made with heated air. *Subject Headings:* **1. Psychromet 2. Psychrometric measurement techniques.**—*I.L.D.*

10.11–116 551.508

Ringwalt, David L. (*U. S. Naval Res. Lab.*), **The NRL ultraviolet humidiometer.** *Weat Radar Conference, 7th, Miami Beach, Florida, Nov. 17–20, 1958, Proceedings*, issued 19 Sec. F:44–52. 8 figs., 2 refs. **DWB** (M01.81 R124pc, 1958)—A simple, lightweight instrum with rapid response, has been developed for the direct measurement of atmospheric wa vapor density. The operation of the instrument is based upon the high (387/cm) absorpt coefficient of water vapor for the Lyman-alpha (1215.6 A) line of hydrogen. A small gl glow tube, filled to 0.2 mm with hydrogen, emits radiation at Lyman-alpha. The radiat traverses a 4-cm measuring path and enters a nitric-oxide gas photoionization chamber. fixed geometrical and electrical parameters, the resulting ionization current is determined the water vapor density in the path, other atmospheric gases having negligible effects. *Sub Heading:* **1. Ultraviolet humidiometers.**—*Author's abstract.*

10.11–117 551.508

Sonntag, D., **Ergebnisse von Hygrometermessungen mit normalen und gewalzten Haa in Wetterhütten.** [Results of hygrometer measurements with normal and rolled hairs

nstrument shelters.] *Zeitschrift für Meteorologie*, Berlin, 12(1/2):34–36, Jan./Feb. **1958.** table, 4 refs. **DWB, DLC**—The registrations of normal and rolled hair hygrometers in the laboratory were compared with psychometric readings in an instrument shelter in order to determine whether the deviations between these two methods of measuring relative humidity remain the same under field conditions. The laboratory results were confirmed and the measurements indicate the following: at relative humidity $\geq 95\%$, the hygrometers registered correctly when kept for a long while at this humidity; with relative humidity $<95\%$, the hygrometers registered properly; when the hygrometer was kept an entire night above 95% relative humidity it registered several percent above this value during decrease in humidity; beginning with 70–90% the registrations are too high during the humidity decline, etc. The results of a comparison between the efficiency and accuracy of normal hair and rolled hair hygrometers indicate that for low relative humidity the latter is more accurate but otherwise the results obtained are not better. Inertia coefficients, in seconds, for normal and rolled hair are presented in a table. *Subject Headings:* **1. Hygrometer hair efficiency 2. Hair hygrometer comparisons.**—*I.L.D.*

10.11–118 551.508.71

Sonntag, D., **Hinweise für die Praxis der Hygrometereichung und -messung.** [Practical hints for hygrometer calibration and measurement.] *Zeitschrift für Meteorologie*, Berlin, 12(1/2):36–38, Jan./Feb. **1958.** table, 6 refs. **DWB, DLC**—In calibrating a hair hygrometer it is necessary to determine whether the individual hair or hair bundle has been overloaded, whether the amplitude has been set up so as to extend from 0 to 100%, and whether the scale divisions have been tested under conditions of humidity decrease. The use of the downslope curve in calibration, especially from 95% relative humidity, is recommended. The possible sources of error in hygrometer recordings, the relationship of regeneration of the hygrometer hair to measurement in the downslope of the curve, the prescriptions provided by F. FRANKENBERGER in eliminating the rise effect, the correction for the error resulting from incoming and outgoing radiation, and error arising through soiling of the hygrometric hair, are considered. *Subject Headings:* **1. Hygrometer calibration 2. Hair hygrometers.**—*I.L.D.*

10.11–119 551.508.71

Suomi, V. E., **Double-psychrometer lift apparatus—University of Wisconsin.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile,** N. Y., Pergamon Press, **1957.** Vol. 1:183–187. fig., 2 refs., 2 eqs.) **DWB**—The double psychrometer lift apparatus installed at O'Neill consisted of "an automatic elevator which moved the lower psychrometer to the 0.8 m position and simultaneously moved the upper psychrometer to the 0.4 m position and vice versa." The dry bulb temperature difference was measured with a 10-junction copper-constantan thermocouple. In order to minimize radiation errors each bulb was mounted coaxially within a pair of concentric polished cylinders. The wet bulb portion of the psychrometer was constructed in a similar manner. The psychrometer theory is summarized. The recording of the thermocouple outputs for the dry bulb difference, the depression difference, absolute value of the wet bulb, etc., data processing sampling theory and probable errors are discussed. *Subject Heading:* **1. Psychrometer lift apparatus.**—*I.L.D.*

10.11–120 551.508.71

Thornthwaite, C. W. and Hacia, H. (*both, Lab. of Climatology, Centerton, New Jersey*), **Dew point apparatus—Johns Hopkins University.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:176–182. fig., 5 refs.) **DWB**—The automatic dew point recorder developed by THORNTHWAITE consists of essentially three parts: the mirror assembly containing the thermocouple circuit for measuring the condensation temperature and the cooling-heating component for controlling the temperature of the mirror, the sensing element composed mainly of the photoelectric cells which observe the dew film and the circuit for switching the heating component on and off, and the air sampling element. A detailed description of the elements of the dew point recorder and their operation is presented. The data collection at O'Neill and various error considerations are discussed. *Subject Heading:* **1. Dew point recorders.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Synoptic conditions for glaze** (Bennett), 10.11–20; **T.V. weather maps** (Higgins), 10.11–27; **Forecasting weather at sea** (Zubkov), 10.11–28; **Agromet. forecasting** (Springer), 10.11–33; **Stratus and fog forecasts** (Casanobe, Lombardo), 10.11–67; **Forecasting fog, Friendship Airport** (Harrison), 10.11–71; **Clear air turbulence forecasting** (Harrison), 10.11–72; **Synoptic models for forecasting** (Kochanski), 10.11–98; **Incorporation of nonadiabatic processes into baroclinic models** (Vitek), 10.11–145; **Synoptic analysis of nonadiabatic processes** (Vitek), 10.11–150; **Long range tem. forecasting, Macquarie Is.** (Loewe), 10.11–173; **Hydrol. forecasting** (Nyberg), 10.11–226; **Short range forecasting improvement** (Tepper), 10.11–243; **Solar emission-weather forecasting relationships** (Halacy), 10.11–251.

10.11–121 551.509:519

Sanders, Frederick, **The evaluation of subjective probability forecasts.** Mass. Institu of Technology. Dept. of Meteorology, Contract AF 19(604)-1305, Scientific Report No. June **1958.** 57 p. 5 figs., 8 tables, 6 refs., 12 eqs. **DWB**—An evaluation is made of a lar number of subjective probability forecasts referring to a wide variety of weather elements a conditions and to time periods up to twenty hours in advance. These forecasts are found be generally quite reliable, if reliability is measured by the correspondance between ea forecast probability value and the corresponding percent frequency of occurrence of the foreca weather condition (mean "observed" probability value). The forecast probability valu and the corresponding percent frequencies of occurrence are expressed in terms of departu from climatological expectancy. It is then found that the observed departure values are or about three quarters of the forecast departure values. A method is presented of scoring t probability forecasts in terms of a percent reduction over climatology. It is shown that t percent reduction suffers not only because of lack of reliability, as defined above, but a because of lack of resolution. The resolution of a set of forecasts representing a particu forecast probability value is measured by the variance of the individual "observed" probabil values about their mean for that set. Lack of resolution is primarily responsible for the rat modest percent reduction yielded by the subjective probability forecasts. A negative perc reduction is found in those forecasts which refer to weather conditions which occur either v infrequently or very frequently. Probabilistic forecasts are discussed in relation to categori forecasts, and some advantages of the former are elucidated. *Subject Headings:* **1. Probabil forecasting 2. Forecast verification.**—*Author's abstract.*

10.11–122 551.509.25:51

Hsu, E. H. (*Univ. of Nanking*), **A new experiment on preparing 1000 mb and 500 prognostic charts by graphical integration.** *Acta Meteorologica Sinica*, Peking, 29(3):185–2 Aug. **1958.** 12 figs., 14 refs., 40 eqs. In Chinese; English summary, p. 200. **DLC**—A n method of preparing 1000 mb and 500 mb prognostic charts by graphical integration is p posed. Its main features are: (1) The vertical structure of whole troposphere is taken i consideration. Sawyer-Bushby's model is used in actual computation; but the method be extended to other models, e.g., Eliassen's model. (2) 500 mb surface is not taken as level of nondivergence, which may be placed at other appropriate isobaric surface. proposed method consists essentially in calculating the height changes of 1000 mb and 500 surfaces by means of certain advections on equivalent-baroclinic levels defined by Bo Some results of the experiment are discussed. *Subject Headings:* **1. Graphical integra 2. Prognostic chart preparation.**—*Author's abstract.*

10.11–123 551.509.25 551.509.317:551.5

§Reuter, H., **Grundlagen einer synoptisch-statistischen Theorie der Druckänderung Konstruktion von Vorhersagekarten mit Hilfe einer Korrelation zwischen räumlichen zeitlichen Mittelwerten.** [Principles of a synoptic-statistical theory of pressure chan construction of prognostic charts with the aid of a correlation between space and time a ages.] *Archiv für Meteorologie, Geophysik und Bioklimatologie Ser. A*, Vienna, 10(2/3):1 143, **1957.** 11 figs., 3 refs., table, 5 eqs. German, English and French summaries p. 121– **DWB, DLC.** Shortened form with same title issued in *Meteorologische Rundschau*, Be

11(5):165–166, Sept./Oct. **1958.**—The principles of a synoptic-statistical theory of pressure variations are based upon the assumptions that a close correlation exists between two values of a meteorological element (in this case the height of the 850 mb contours) separated by a given time interval at a given point and that an appropriate regression equation can be derived with the aid of generally valid principles. The general principles are: the principle of persistence tendency of pressure anomalies (with regard to long range period normals), the principle of equalization tendency of existing pressure differences, and the principle of compensation or opposition of certain processes, i.e., a mechanism that produces contrary effects in the vertical and horizontal distribution of the meteorological quantity considered. From the first two principles expressed by the equations $_{1a}\widehat{h}_{3a} = \frac{3h_{0a}+2N}{5}$ which is the principle of persistence tendency, where N = normal value for the given month and $\frac{\Delta T_0}{\Delta t} = \frac{4k}{d^2}(T-T_0)$, the principle of equalization tendency is derived from the regression equation $(\widehat{h}-N) = a(\bar{h}-N)+b$ and the correlation coefficient is $r = \sqrt{a' \cdot a}$. The regression equation becomes $\widehat{h} = h$ for $a \sim 1$ and $b \sim 0$ and on the basis of this relationship prognostic charts are constructed by writing the $\widehat{h} = h$ in the form of the forecast formula $_{0p}\widehat{h}_{1p} = \frac{h_{0p}+h_{1a}+h_{1p}}{3} = \frac{5h_{0a}-h_{0a}-h-1p.}{3}$ The practical application of this formula is illustrated for 10 weather situations. The resulting correlation coefficients for the skill of the forecast range between 0.86 and 0.98. *Subject Headings:* **1. Upper air pressure variations 2. Prognostic chart preparation 3. Synoptic conditions for pressure changes.**—*I.L.D. and author's summary.*

10.11–124 551.509.25:551.509.312:519.241.1

§Reuter, Heinz, **Über die Konstruktion von Vorhersagekarten auf synoptisch-statistischer Grundlage.** [Constructing prognostic charts on the basis of synoptic and statistical methods.] *Germany. Deutscher Wetterdienst, Berichte,* 7(51):96–99, **1959.** 9 figs., 3 tables, 4 refs., 5 eqs. German and English summaries p. 96. **DWB, DLC**—The author developed a synoptic-statistical theory which has been outlined in a previous publication (*see* 10.11–123, this issue). Using synoptic principles—e.g., the persistence tendency, the steering mechanism, the principle of compensation—formulas may be derived, which make it possible to compute height variations of the 850 mb surface 24 and 72 hrs in advance. By this method only mean prebaratics over the period of 24 and 72 hrs can be constructed. The skill of the new method was proved for a total of 100 weather situations. The correlation coefficients between forecast and true charts range from 0.75 to 0.90. A further investigation deals with a combination of the statistical method with Fjørtoft's graphical integration of the barotropic vorticity equation. While the advection of the absolute vorticity is carried out using a space mean contour field, as proposed by Fjørtoft, the variation of the mean field itself is forecast by statistical formulas. It is shown that prognostic charts of actual contour lines can be constructed by this method 24 and 48 hrs in advance very rapidly. The application of this method to one case shows good agreement between forecast and true contour field. *Subject Headings:* **1. Prognostic chart preparation 2. Fjørtoft's graphical method.**—*Author's abstract.*

10.11–125 551.509.25:551.509.5

Reymann, G., **Zur Beurteilung von Vorhersagekarten.** [Verification of prognostic charts.] *Meteorologische Rundschau,* 11(1):13–19, Jan./Feb. **1958.** 9 figs., table, 4 refs., 10 eqs. **DWB, DLC**—The customary method of verifying a forecast map by correlating the predicted with the actually observed pressure change field and by a mean error or scatter measure is examined critically. The various errors involved in the verification, namely: the level error, the amplitude error and scattering error are analyzed and their statistical treatment is presented with the aid of equations. From a comparison of the advantages and disadvantages there is obtained a computed relative error analogous to the correlation coefficient and an unobjectionable measure of the pressure change. Since the pressure changes show, on the average, high and usually a slightly characteristic correlation and the time differences in the analysis of a pressure field change are largely independent of the pressure changes, it is more appropriate to verify forecasts by comparing the stream fields. This procedure is described

in detail with the aid of relevant formulas and an actual example. *Subject Heading:* **1. Foreca verification.**—*Author's summary and I.L.D.*

10.11 126 551.509.31:551.509.

Pchelko, I. G., **20 let nauchno-issledovatel'skoĭ raboty Instituta v oblasti izyskan metodov kratkosrochnykh i dolgosrochnykh prognozov pogody.** [20 years of scientific resear by the Institute in the field of investigation of methods of short and long range weather fo casting.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy,* No. 55:12–22, **1957. DLC.** The Central Bureau of Forecasting was established in 1930 in the Central Geophysical C servatory. The rapid expansion of its research, educational and practical activities led to t establishment of the Central Institute of Forecasting in 1936. In this paper the auth reviews in chronological order the results of some investigations on short and long ran forecasting carried out in this Institute. Theoretical investigations on short range forecasti included the theory of wind rotation with altitude during transition through a frontal zon the development of an energogram for better utilizing temperature data of a probed atmosph (Diubiuk); the determination, with the aid of Kibel's solutions, of vertical currents accordi to the equations of continuity for calculating changes of temperature and humidity alo in order to make more exact the formula for determining pressure variation; the developm of a new solution for short range pressure forecasting by using Fridman's equation, e Synoptic empirical studies on short range forecasting include the advective-dynamic meth of synoptic analysis for studying the three-dimensional structure of the atmosphere develop by Pogosian and Taborovskiĭ, etc. Theoretical work on long range forecasting began 1943 with Blinov who obtained a mathematical expression for forecasting the pressure fi 10–20 days in advance on the basis of a central distribution of pressure and temperatu further investigations included the interaction of western transport and meridional incursio the effect of various levels and of stratification in relation to the formation of a quasipolytro atmosphere, etc. During the past 10–12 years synoptic-empirical studies on long ra forecasting, Multanovskiĭ's ideas of the synoptic season and of basic processes were reviv The quality of these forecasts has not improved perceptibly during the past 10 years. Meth have been developed for forecasting temperature anomalies for the winter months, als special index of analogousness of scalar fields has been developed. Among the climatolog studies the following may be mentioned, viz.: monthly and decadal temperature normals of Northern Hemisphere, a new conception of moisture exchange, climatic description of airport areas and routes of the civil aviation fleet, etc. *Subject Headings:* **1. Short ra forecast research 2. Long range forecasting techniques 3. Central Institute of Forecasti Moscow, U.S.S.R. 4. U.S.S.R.**—*I.L.D.*

WEATHER MODIFICATION

See also: **Hail protection** (Genève), 10.11–212

10.11–127 551.50

Bossolasco, Mario, **Vedute sull'influenzamento artificiale dei fenomeni meteorolog** [Artificial modification of meteorological phenomena.] *Geofisica e Meteorologia,* Ge 6(1/2):13–17, April **1958.** 4 refs. **DWB**—The author discusses the artificial modifica of climate, in particular precipitation, by controlling evaporation on limited areas of sea surf near continents. By seeding a given surface with particular nuclei, which will be evapora into the air, hail can be prevented. The role of sand transported by winds at altitude 3000 to 9000 m across Europe as far as Poland, in the formation of late winter and spring ra is discussed. The minute sand particles capture water vapor, other particles rising higher altitudes are transformed into ice nuclei and from cumulus and stratocumulus cl precipitation can be initiated more easily. A modification of the Sahara surface would h an effect upon the rainfall regime of Europe. *Subject Headings:* **1. Evaporation control 2. A ficial precipitation 3. Artificial influences on weather.**—*I.L.D.*

10.11–128 551.509

Aufm Kampe, H. J.; Kelly, J. J. and Weickmann, H. K. (*all, Signal Corps Enginee Labs.*), **Seeding experiments in subcooled stratus clouds.** *Meteorological Monographs,* Bos

2(11):86–111, July **1957.** 34 figs. **DWB, DLC**—Seeding experiments with dry ice and silver iodide are described. The experiments indicate that it is possible to dissipate large cloud areas by seeding them with dry ice if the temperature is below approximately −4°C and the cloud decks are stable. For successful silver iodide seedings, the cloud temperature should be around −10°C and the seeding rate should be of the order of 100 gm AgI per mile. *Subject Headings:* **1. Cloud seeding experiments 2. Cloud seeding with dry ice 3. Cloud seeding with silver iodide.**—*Authors' abstract.*

10.11–129 551.509.616

Fournier d'Albe, E. M. (*Inst. de Ciencias Aplicadas, Univ. Nac'l de Mexico*), **Cloud-seeding trials using common salt.** (In: Conference on the Physics of Cloud and Precipitation Particles, Sept. 1955, **Proceedings.** pub. N. Y., Pergamon Press, **1957.** p. 207–212. 2 figs., ref.) **DLC** (QC921.5.U5), **DWB**—Results of NaCl seeding in 1954 by the Pakistan Meteorological Service are analyzed, discussed and illustrated. Cloud bases were usually about 20°C so it was assumed clouds were of the warm type. Seeding from ground generators at Lahore was carried out from July 16–Sept. 15, 1954 on 39 days out of 61 (some seeding was done at Jauharabad in the Thal District, 210 km WNW of Lahore). Seeding was attempted only when winds were easterly and low clouds visible from the station. Results of a comparison of seeding areas with control area (upwind) show an increase of precipitation in 1954 compared with control area precipitation for 1901–1942. Results and significance thereof are discussed at length. *Subject Headings:* **1. Cloud seeding with salt 2. Cloud seeding evaluation 3. Lahore, Pakistan.**—*M.R.*

10.11–130 551.509.617

†Mehta, Desraj and Ghosh, S. K., **Possibilities of artificial rainmaking in India.** *India. Central Board of Irrigation and Power, Annual Report (Technical)*, 2:371–380, 1952, issued **1954.** tables, 32 refs. **DWB** (626.8 I39a)—A review of methods of cloud seeding; cloud analysis with a "radiosonde" containing a string saturated with a hygroscopic salt solution; experiments in Australia, East Africa and India; seeding with balloons carrying AgI, solid CO_2, etc. Dangers of artificial rain and conservative opinions of scientists are offset by potential benefits and prospects. *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding potentialities 3. Cloud seeding in India.**—*M.R.*

10.11–131 551.509.615

Olivier, J. (*Aéroport de Lyon-Bron*), **Essais d'atténuation artificielle du brouillard.** [Experiment at artificial attenuation of fog.] *Puy de Dôme. Observatoire, Bulletin*, Ser. 2, No. 1:4–6, Jan./March **1956.** fig., 2 refs. **DWB**—On Jan. 22, 1956, between 08:30 and 09:30h, two attempts were made to dissipate fog by means of release of propane gas from bottles at Lyon-Bron Airport. The temperature was −3° to −4°C and the fog unusually dense (visibility 40 m). The 17 kg bottles of propane cost 1740 fr each (100 fr/kg). The effects, as shown on the transmissometer record reproduced herein, were a marked lowering of the density from 25 to <10 (visibility raised from 50 to 130 m) and a sudden increase in density as wind drifted a wall of dense fog back over the line of the transmissometer. Particles of snow were seen to fall rapidly from the area which was attenuated. Little effect was noted toward the sky—the sun was not seen. A second attempt had little effect as the fog was lifting. *Subject Headings:* **1. Artificial fog dissipation 2. Propane fog attenuation 3. Lyon-Bron Airport, France.**—*M.R.*

10.11–132 551.509.616

§*Spain. Servicio de Investigacion y Ensayos de Lluvia Artificial, **Ensayos de lluvia artificial en el Pirineo Leridano, Periodo lo octubre 1954 a 31 mayo 1956.** [Experiments in artificial rainfall in the Leridan Pyrenees, Oct. 1, 1954–May 31, 1956.] issued **1957?** 301 p. numerous figs. (some fold.), tables. **DWB** (M09.67 S733e)—An elegant report on artificial rainfall experiments, covering 20 months of carefully executed tests in an area mostly on the Spanish side of the Pyrenees. The work consists of 3 parts: I. Physical investigations, II. Statistical studies and III. Month by month summary of meteorological and synoptic data pertinent to cloud seeding trials. Seeding was performed with AgI during the 12 months

Oct. 1954–Sept. 1955. A series of analyzed synoptic charts is presented for each seedi situation. The meteorological conditions resulting in natural precip. and those favorable f artificial precip. are discussed at length and illustrated with schematic diagrams. Therm dynamic, synoptic and statistical aspects are discussed at great length and the text support by beautiful charts and other illustrative material. *Subject Headings:* **1. Cloud seeding projec 2. Statistical tests of cloud seeding 3. Leridan Pyrenees, Spain.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC POLLUTION

See also: **Atmos. pollution bibliogs.,** 10.11–56.

10.11–133 551.510.42:628.

Nonhebel, G. (*Imperial Chem. Indust., Millbank, London*), **The technical provisions of t British Clean Air Act.** *International Journal of Air Pollution*, N. Y., 1(1/2):120–138, O **1958.** fig., 2 tables, 17 refs. **DWB, DLC**—The technical provisions relating to industry this new legislation all came into force on 1 June 1958; the sections permitting the declarati of Smoke Control Areas in which domestic smoke is prohibited came into force on 31 Dec. 19 The main points of the technical regulations for the control of smoke, dust, grit and gases fr industrial plants are quoted and discussed. Smoke from general industry is strictly limited density and duration, and prior approval is required of dust arrestors and chimney heights f new factories. Administration of these regulations is by local authorities except that proces where there are special technical difficulties in preventing air pollution are placed under t supervision of the Alkali Inspectorate, who for 94 years have controlled many chemical wor and whose duty is to ensure that best practicable means are used. No other country has su comprehensive legislation. *Subject Headings:* **1. Atmospheric pollution control 2. Smo abatement laws 3. Smoke prevention.**—*Author's abstract.*

10.11–134 551.510.42:551.575.1:541.

Rogers, Lewis H. (*Air Pollution Foundation, San Marino, Calif.*), **Report on photochemi smog.** *Journal of Chemical Education*, 35(6):310–313, June **1958.** 2 figs., 3 tables, 17 re **DLC**—Differences in the meteorological and chemical characteristics of the London and L Angeles smogs are clearly shown in table. London fogs occur in cold foggy periods and a caused by a mixture of pollutants; Los Angeles smog occurs in the middle of hot sunny da and is due to organic matter and nitrogen oxides reacting photochemically. The Lond Donora and Meuse smogs caused numerous deaths. The Los Angeles smog produces o eye irritation, plant damage and discomfort. Nature of Los Angeles smog is discussed, oxida records and automobile emissions presented in table and graph, and a chart showing isople of traffic density and eye irritation intensity included. Other studies in connection w photochemical smog are cited and remedies suggested. *Subject Headings:* **1. Photochemistry smog 2. London vs. Los Angeles smog 3. London, Eng. 4. Los Angeles, Calif.**—*M.R.*

STRUCTURE OF THE ATMOSPHERE—UPPER ATMOSPHERE—IONOSPHERE

See also: **Antarctic tropopause** (Alt), 10.11–18; **Satellite obs. of upper atmos. density** (Horn), 10.11–65; **Zonal circulation in stratosphere** (Vassy, A. and E.), 10.11–153; **Solar eruption effects on ionospheric perturbations** (Koeckelenbergh), 10.11–252; **Diffraction shadow of a stratified troposphere** (Berg), 10.11–255.

10.11–135 551.510.535:551.594.

Ratcliffe, J. A. (*Cavendish Lab., Univ. of Cambridge*), **The ionosphere.** (In: Bates, D. (*ed.*), **The Earth and its atmosphere.** N. Y., Basic Books, **1957.** p. 204–222. fig.) **DLC** Discovery of the ionosphere, production of ionized layers, propagation of radio waves thro ionized air, proof of existence of the ionosphere, ionospheric soundings, ionospheric obser tories, $h'(f)$ curves and critical frequencies, the E and F_1 layers, the peculiar F_2 layer, elect

currents in the high atmosphere, horizontal movements of the ionosphere, solar effects (ionospheric storms and SID's), and world-wide ionospheric studies during IGY are discussed at some length in a popular style. *Subject Headings:* **1. Ionospheric structure 2. Ionospheric electric fields.**—*M.R.*

10.11–136 551.510.535:551.510.62

Taubenheim, Jens (*Berlin-Adlershof*), **Messungen der Absorption von Kurzwellen in der Ionosphäre.** [Measurement of the absorption of short waves in the ionosphere.] *Freiberger Forschungshefte, Ser. C, Geophysik*, No. 29:1–18, Oct. **1956** (issued Berlin, Akademie Verlag). 8 figs., 22 refs., 10 eqs. **DWB**—A review of recent knowledge concerning absorption of short radio waves in the various ionospheric layers, methods of measurement, the relation to propagation and the relation of propagation to knowledge of the electrical properties of these layers of the upper atmosphere. Diurnal, seasonal, sunspot cycles and eclipse effects or variations are discussed and illustrated. Focussing and de-focussing are illustrated schematically. *Subject Headings:* **1. Ionospheric absorption of short waves 2. Ionospheric variations.**—*M.R.*

10.11–137 621.396:551.510.535:551.590.21

*Taylor, Eloise W., **Absorption of radio waves reflected at vertical incidence as a function of the sun's zenith angle.** *U. S. National Bureau of Standards, Journal of Research*, 41(12):575–579, Dec. **1948.** 2 figs., 3 tables, 2 eqs. **DWB**—The diurnal variation of ionospheric absorption is related to the sun's zenith angle. The absorption values for this study were obtained from the continuous automatic field-intensity recordings made at the Central Radio Propagation Laboratory on two frequencies. Because of proximity of the receiving station to the transmitting station, reflections are obtained at nearly normal incidence. An analysis of data covering a period of 3 years indicates that little error is introduced by assuming a linear dependence of absorption upon the cosine of the sun's zenith angle. *Subject Headings:* **1. Radio wave reflection 2. Ionospheric absorption 3. Solar influences on ionosphere.**—*Author's abstract.*

10.11–138 551.510.535:551.594.13:550.385

Thomas, J. O. and Robbins, Audrey (*both, Cavendish Lab., Cambridge*), **The electron distribution in the ionosphere over Slough, Pt. 2, Disturbed days.** *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2):131–139, Dec. **1958.** 6 figs., 9 refs., eqs. **DLC**—An account is given of how the heights of maximum electron density of the F1 and F2 layers and the sub-peak electron content vary over Slough (England) during magnetic storms. The parameters have been taken from detailed true-height electron density distributions calculated from observed $h'(f)$ curves in 6 months representing three seasons in a year of low, and a year of high sunspot number. Attention is drawn to the fact that variations of h' F2 during a storm should not be taken to represent changes of height of the F2 layer. The height of maximum electron density in the F2 layer is found to increase in storms, particularly at night. The height of maximum electron density in the F1 layer also increases. Comparison with the magnetograms recorded at Abinger during individual storms shows that ionospheric storm effects occur almost immediately after the magnetic changes. Some important changes have been noticed in the ionosphere at the time of a world-wide sudden impulse. (For Pt. 1, *see* 10.5–211, May 1959, *MAB.*) *Subject Headings:* **1. Ionospheric electron density distribution 2. Magnetic effects on ionosphere 3. Slough, Eng.**—*Authors' abstract.*

RADIOACTIVITY OF THE ATMOSPHERE

10.11–139 551.510.7

Stremme, W. (*Frankfurt a.M.*), **Ergebnisse der Messungen von Radioaktivität in Luft, Wasser und Boden.** [Results of radioactivity measurements in air, water and soil.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:161–166, **1958.** 5 figs., 2 tables, 9 refs. **DWB**—After a brief discussion of the quantities of natural radioactivity, the author summarizes the results of continuous measurements of radioactivity in the atmosphere, water and soil carried out since 1953. The β-activity of fission products in the lower atmosphere in Heidelberg during 1954 and 1956 was monthly around 10^{-13} $\mu c/cm^3$ but weekly around 10^{-12} $\mu c/cm^3$; Sr^{90} which has a half-life of 28 years will attain a "fall out" intensity of 7 mc/mi² in 1970. The

composition of fission products depends upon their age; with increasing age the long-live constituents increase in importance while the total activity declines at a rate of $1/t$ (t=tim from data of explosion). The atmospheric fission products are either washed out by precipit tion or precipitated on soil and vegetation. In Heidelberg the specific long life-activity precipitation ranged from February to June between 0.4×10^{-7} μc/cm^3 and 10×10^{-7} μc/cm Tables and graphs giving values of atmospheric radioactivity as measured at different place amount of Sr^{90} brought to the soil by precipitation, etc. are presented. *Subject Heading* **1. Radioactivity in the atmosphere 2. Radioactivity in soil 3. Radioactivity in surface wate 4. Radioactivity measurement techniques 5. Heidelberg, Germany.**—*I.L.D.*

10.11–140 551.510.

Delwiche, C. C. and Stout, P. R. (*both, Kearney Foundation of Soil Science, Univ. Calif.*), **Diurnal and other fluctuations in atmospheric radioactivity of natural origin.** *Americ Meteorological Society, Bulletin*, 40(6):285–290, June **1959.** 3 figs., 17 refs. **DWB, DLC** The radioactivity of the atmosphere resulting from natural sources has been monitored co tinuously for a period of two years. The method consists of collecting on moving strips filter paper the daughter products of radon and thoron decay—principally Pb^{212} and Pb^2 The highest activities found were 5×10^{-13} curies per liter of atmosphere and the lowest valu in the order of 10^{-14} curies per liter. Changes in radioactivity may take place very rapidly that a very high value may fall to one of the low values within an hour or less. Recent histo of the air mass being sampled determines its content of these radioactive isotopes of natur origin. Maximal values are always characterized by still air held over land. Minimal valu have been associated with air masses having been held over the sea where replenishment radon is much reduced. The turbulence of winds causes mixing of radon with greater mass of air with correspondingly diluted levels of radioactivity. In spite of the high degree variability in atmospheric radioactivity from day to day or even from hour to hour, averag of the mean hourly activities when taken over a year in Berkeley, Calif. show a well defin diurnal fluctuation. In this respect, data for 1955 are very close to those for the year 19 On the yearly average, maximum activity occurs at 6 a.m. and minimum activity at 6 p. The averaged radioactivity of the atmosphere in the morning is about 40% greater than t activity in the evening. This difference is probably a reflection of the tendency for offsh winds to migrate inland during the afternoon hours. Samplings of stagnant air in wells a caves showed very high activity as compared to the open atmosphere. As much as 10^{-10} cur per liter of air have been observed in enclosed atmospheres. *Subject Headings:* **1. Radi activity in the atmosphere 2. Radioactivity variations.**—*Authors' abstract.*

10.11–141 551.510.721:61

Commoner, Barry (*Washington Univ., St. Louis, Mo.*), **The fallout problem.** *Scien* Wash., D. C., 127(3305):1023–1026, May 2, **1958.** 6 refs. **DLC**—This paper contains summary of the possible health hazards from fallout found in the Joint Congressional Co mittee on Atomic Energy report of June 1957. A broad educational campaign that will k the scientist, as well as the layman, well informed of the fallout radiation problem is suggest *Subject Headings:* **1. Radioactive fallout hazards 2. Biological effects of radioactivity.**—*N*

10.11–142 551.510.

Graham, Ellis R. (*Los Alamos Scientific Lab., N. M.*), **Weathering of fallout.** *Scien* Wash., D. C., 129(3358):1276–1277, May 8, **1959.** 2 tables, 3 refs. **DWB**—Subjected weathering by electrodialysis, fallout pellets collected at Nevada testing site after a nucl explosion from the area near ground zero showed trace amounts of their total beta activ Airborne fallout collected 612 mi from the test site released 51.8% of its Sr^{90} activity. craft-collected fallout released 40.5% of its Sr^{90} activity when collected from a tower shot a 86% when collected from a balloon shot. *Subject Heading:* **1. Radioactive fallout weather** —*Author's abstract.*

10.11–143 551.510.721(4

Pierce, E. T. (*AVCO Res. Division, Wilmington, Mass.*), **Some calculations on radioac fallout with especial reference to the secular variations in potential gradient at Eskdalem**

Scotland. *Geofisica Pura e Applicata*, Milan, 42:145–151, 1959. fig., 2 tables, 6 refs. **DLC**—From a study of the variations in potential gradient at Eskdalemuir, Scotland, it is shown that the radioactivity there has roughly doubled during the past six years; in other words, a radioactive contamination equal in activity to the natural background has occurred. Calculations indicate that only some 2% of this contamination can be ascribed to world-wide fall-out following thermonuclear explosions; the remainder must have been generated locally. The obvious sources are the atomic stations—notably Windscale—in Cumberland, and it is considered that, apart from the accident in October 1957, Windscale has leaked radioactive material ever since it first came into operation. The resultant contamination is very considerable and its relation to danger levels is discussed. *Subject Headings:* **1. Radioactive fallout data 2. Radioactivity in the atmosphere 3. Eskdalemuir, Scotland.**—*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Heat sources and sinks** (Murgatroyd), 10.11–164; **Microstructure of turbulence** (Obukhov, Iaglom), 10.11–179; **Local wind patterns** (Countryman, Colson), 10.11–192.

10.11–144 551.511:551.558.1:551.576.11

Haltiner, G. J. (*U. S. Naval Postgraduate School*), **On the theory of convective currents.** *Tellus*, Stockholm, 11(1):4–15, Feb. 1959. 7 figs., table, 8 refs., 30 eqs. **DLC**—A theory of steady state, saturated, convective currents is presented which includes the transfer of heat and momentum by lateral diffusion as well as the systematic entrainment of environmental air. The system of equations governing the behavior of such convective currents is derived and numerically integrated for a variety of initial and environmental conditions. In agreement with basic physical principles, it is found that the cloud height, mass, vertical velocity, temperature excess over the environment, and liquid water content all increase with increasing (a) initial temperature, (b) environmental relative humidity, and (c) environmental lapse rate; but all decrease as the diffusion coefficient increases. Also the cloud height, vertical velocity, temperature excess, and liquid water content increase with increasing initial velocity; however, the total mass of air decreases with increasing initial velocity, reflecting a lower rate of entrainment. Even with frictional drag in the form of momentum loss by diffusion, the updraft overshoots the level of zero buoyancy in the upper part of the cloud, giving rise to cloud temperatures at the cloud top which may be several degrees colder than the environment. When applied to an upper-air sounding taken near the time and location of a thunderstorm, the model gives the right order of magnitude for the cloud height, vertical velocity, and temperature excess over environment for a diffusion coefficient of $k_2 = .001$ sec^{-1}. While the life cycle of a convective cloud is certainly not a steady-state phenomenon, the theory probably affords a fair approximation of the convective cloud during the updraft stage. *Subject Headings:* **1. Convective currents 2. Heat transfer 3. Convective cloud thermodynamics.**—*Author's abstract.*

10.11–145 551.511:551.513.1:551.509.313

Vítek, Vojtěch (*Geophysical Inst., Czech. Acad. Sci., Dept. of Short-range Forecasting, Prague*), **On the question of the incorporation of non-adiabatic processes into baroclinic models.** *Studia Geophysica et Geodaetica, Prague*, 2(3):274–279, 1958. 4 refs., 7 eqs. Russian summary p. 279. "Presented on the 11th IUGG Congress, Toronto, Sept. 1957." **DWB**—Prognostic equations are developed from a simple baroclinic model assuming nonadiabatic conditions. The prognostic expressions of this model are derived from the vorticity and divergence equations. They are capable of accounting for situations involving orographic influences and vertical displacement of the zero divergence level. Possibilities of numerical integration of these prognostic equations are examined and it is shown that the equation for relative topography developed by SUTCLIFFE and FORSDYKE can be adapted to the proposed model in calculating nonadiabatic processes in the lower half of the troposphere. *Subject Headings:* **1. Nonadiabatic processes 2. Baroclinic models 3. Prognostic equations.**—*Transl. of author's abstract.*

10.11–146 551.511.13:551.524.4

Dufour, L. (*Royal Met. Inst., Belgium*), **Sur le taux de variation adiabatique de la tem pérature en fonction de la pression dans une masse d'air contenant un cristal de glace sphéri que.** [The rate of adiabatic variation of temperature as a function of pressure in an air mas containing a spherical ice crystal.] *Tellus*, Stockholm, 11(1):1–3, Feb. **1959.** 6 refs., 24 eqs **DLC.** English summary p. 1. **DWB**—The formula giving the rate of variation is establishe under the assumption: 1) that the transformation is adiabatic and 2) that this transformatio is reversible. After having examined the order of magnitude of the different terms of th equations in order to determine those which can be neglected one can deduce the rate c variation. One can show that the formulas in classical thermodynamics, giving the rate c variation for saturated and for dry air, are special cases of the general formula. *Subje Headings:* **1. Adiabatic processes 2. Temperature variations.**—*Author's abstract.*

10.11–147 551.511.32:551.555.

Hsu, E. E. (*Univ. of Nanking*), **A 3-dimensional study on the vorticity field over Eas Asia during the outbreak of cold wave.** *Acta Meteorologica Sinica*, Peking, 29(4):239–248 Nov. **1958.** 10 figs., 8 refs. In Chinese; English summary p. 248. **DLC**—As a typical cas the author examines in detail the vorticity field over East Asia during the outbreak of a seve cold wave in the middle of February, 1955. Vorticity is computed by GRAHAM method fro pilot balloon wind data at nine levels from ground up to 5500 m. It is discovered that th region over the surface high center is not completely of negative vorticity; below 1000 m there is weak vorticity center, either of positive sign or of negative sign; between 1000 m an 5500 m, the sign of vorticity is positive in front of the surface high center, and is negativ behind the center; the intensification of the surface high center is manifested by the gradu expansion of the region of negative vorticity. The order of magnitude of various terms in th vorticity equation is evaluated. Both the advection term and the divergence term are of th order $10' \times 10^{-10}$ sec^{-2}; but the latter is greater than the former in absolute magnitude. Th movement, as well as the development, of the upper trough and the wedge may be accounte for by the pattern of isopleths of divergence term, but not by that of advection term. Neith 5500 m surface nor 3000 m surface may be considered approximately as the surface of no divergence. The order of magnitude of the vertical transfer term and the differential vertic velocity term is $10^{\circ} \times 10^{-10}$ sec^{-2}; these terms are definitely of minor importance. It prov incorrect that SHERMAN lays too much emphasis on the differential vertical velocity ter *Subject Headings:* **1. Vorticity field 2. Cold air outbreaks 3. East Asia.**—*Author's abstract.*

10.11–148 551.511.32:551.513

Yoshitake, M. (*Nagoya Local Met. Obs.*), **Propagation of long waves on a rotating glob** *Geophysical Magazine*, Tokyo, 27(4):487–506, Dec. **1956.** 6 figs., table, 10 refs., 62 eq **DWB, DLC**—In the theories of long waves it seems unwarranted to consider the earth flat and to neglect the curvature of the earth. A detailed discussion of this question will given in the present paper. For nondiverging barotropic flow on a spherical earth, new sol tions of the vorticity equation are given. These solutions reveal the difference between t flat and the spherical treatment. As the wave length increases, there appears marked diffe ence between them. The ROSSBY formula ceases to be fitted even for the so-called long wav *Subject Headings:* **1. Long waves 2. Vorticity equations.**—*Author's abstract.*

10.11–149 551.511.33:551.513

Shneerov, B. E., **K voprosu o vliianii pritokov tepla na krupnomasshtabnye dvizheniia atmosfere.** [Influence of heat influxes on large-scale movements in the atmosphere.] *Le ingrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 71:103–111, **1957.** 5 refs., 57 eq **DWB** (M(055) U581tG)—The author attempts to determine the fields of pressure, temperatu and of the component wind velocities by solving the general system of thermal hydromechani equations, which describe the large scale atmospheric movements, if the distribution of te perature for the underlying surface alone is given. The atmospheric processes are consider quasistationary, since the climatic disturbances of zonal pressure and temperature are e amined. In the solution of the problem only heat advection resulting from the condensati of water vapor and turbulent vertical mixing are considered; the influence of orography is n

taken into account. The fundamental equation for disturbed motion in a spherical system of coordinates associated with a rotating earth are derived from the equation of transport of vortical velocity along the vertical axis, the equation of heat advection, the equation of the constituent geostrophic wind, the equation of state and of continuity and the equation for heat advection as a result of condensation. The problem is solved for a nonhomogeneous equation with homogeneous limiting conditions and for a homogeneous equation with nonhomogeneous limiting conditions. *Subject Headings:* **1. Large scale exchange 2. Advection.** —*I.L.D.*

10.11–150 551.511.33:551.509.3

Vítek, Vojtěch, **Návrh methody pro kvantitativní vyhodnocení neadiabatických dějů.** [Proposed method for quantitative analysis of nonadiabatic processes.] *Meteorologické Zprávy*, Prague, 10(3):63–64, **1957.** 3 refs., 7 eqs. Czech, Russian and English summaries p. 63. **DWB.** Transl. into English available. **DWB** (M11 V838pr)—A method is proposed whereby the nonadiabatic term in the equation of tendency of relative topography is considered as an unknown quantity, which is then defined in terms of measurable or computable factors. This method of calculation is applicable to synoptic analysis rather than forecasting. *Subject Headings:* **1. Synoptic analysis 2. Nonadiabatic processes 3. Relative topography.** —*G.T.*

GENERAL CIRCULATION

See also: **Ocean and atmos. circulation,** 10.11–2; **General circulation** (Pogosian), 10.11–9; **Antarctic atmos. circulation** (Alt), 10.11–18; **Jet weather** (McTaggart-Cowan), 10.11–70; **Nonadiabatic processes** (Vitek), 10.11–145; **Long waves** (Yoshitake), 10.11–148; **Mountain effects on air flow** (Musaelian), 10.11–187; **Cold air invasions** (Kononova), 10.11–196.

10.11–151 551.513:551.555.1

Clarkson, L. S. and Littlejohns, L. W., **A cross-section of equatorial upper winds at 103°E.** *Meteorological Magazine*, London, 87(1030):105–107, April **1958.** fig., table, 5 refs. **DWB, DLC**—A cross section of the mean zonal wind flow at 103°E near the equator above the equatorial tropopause (60,000 ft) for April–June 1956 is presented and the results of evaluation at 5000-ft height intervals of the mean westerly component of the 0300–1400 G.M.T. Observed winds over the same period are given in a table and in the form of a cross section. Interesting features of the mean zonal wind structure include "the broad belt of easterlies just below the tropopause, the band of stratospheric westerlies near the equator and the overlying Krakatoa easterlies." *Subject Headings:* **1. Equatorial westerlies 2. Zonal wind profile.**—*I.L.D.*

10.11–152 551.513:551.515.11(78)

Saylor, Harlan K. and Caporaso, Rocco J. (*both, Natl. Wea. Analysis Center, U. S. W. B. Wash., D. C.*), **Development of a large-amplitude 500 mb. trough in western United States and associated surface cyclogenesis, Nov. 13–18, 1958.** *Monthly Weather Review*, Wash., D. C., 86(11):447–456, Nov. **1958.** 7 figs., 7 refs. **DWB, DLC**—During the period from Nov. 13 to 18, 1958, a major upheaval in the zonal index over the U. S. took place, followed by a relatively rapid change to near normal conditions. This development was responsible for extremes in temperature over southwestern and southeastern U. S.; heavy snows in the Rocky Mountains and the north and west-central Plains regions; and an intense, rapid cyclogenesis over central U. S. A rash of tornadoes and high wind storms occurred from north-central Texas into west-central Illinois on Nov. 17 in intimate association with the cyclogenesis and the advancing cold front. Some of the vital statistics of the period are shown in Fig. 1. When considering Fig. 1, one is immediately impressed with the large area over which the extremes in weather occurred. An interesting point is that the broad features of the upper circulation and the mean position of the major frontal zone during the period can be diagnosed without additional information. The purpose of this brief article is to describe by use of 1000 mb, 500 mb, and 1000–500 mb thickness charts the course of meteorological developments

during the period of Nov. 13–18, and, in so doing, to focus attention on some of the salie characteristics. In addition, the usefulness of the operational JNWP 500 mb barotrop prediction to the forecast problem is explored in view of these characteristics and the SUTCLIFI development equation. For purposes of description and identification of characteristics it convenient to divide the period into two stages. Stage I includes the period from 0000 GM Nov. 13, to 0000 GMT, Nov. 17; Stage II, the period 0000 GMT, Nov. 17, to 1200 GM Nov. 18. *Subject Headings:* **1. Large scale circulation 2. Cyclogenesis 3. Zonal ind 4. Barotropic forecasts 5. Western United States.**—*Authors' introduction.*

10.11–153 551.513:551.510.53 551.510.5

Vassy, Arlette and Vassy, Etienne, **La circulation zonale dans la stratosphère; répercussi sur le problème de l'ozone atmosphérique.** [Zonal circulation in the stratosphere; co sideration of the problem of atmospheric ozone.] *Académie des Sciences, Paris, Compt Rendus*, 248(2):270–271, Jan. 12, 1959. 6 refs. **DWB, DLC**—Recent results concerning t mean direction of upper winds show the zonal character of circulation in the stratosphe This zonal character is more and more marked as altitude increases and reveals itself throu easterly winds during summer and westerly winds during winter. Transport of ozone fr south to north cannot be used to explain the changes in the reduced thickness of atmosphe ozone in the course of the year and with respect to latitude; the constant of photochemi equilibrium should be considered. The authors admit, as a first approximation, the existen of a relationship between the mean thickness x of ozone, the incident solar energy J and t temperature of θ of ozone, a relationship expressed in the form $x = J \cdot K(\theta)$. *Subject Headin* **1. Zonal circulation in stratosphere 2. Ozone variations 3. Photochemical equilibrium.**—*A.*

10.11–154 551.513:550.3

Woodbridge, David D. (*Colorado School of Mines*); Macdonald, Norman J. (*High A Obs., Univ. of Colorado*) and Pohrte, Theodore W. (*Colorado School of Mines*), **An appare relationship between geomagnetic disturbances and changes in atmospheric circulation 300 millibars.** *Journal of Geophysical Research*, Wash., D. C., 64(3):331–341, March 19 9 figs., table, 10 refs. **DLC**—This paper describes a study of the average contour leng changes and trough developments at the 300 mb level following geomagnetic disturbances fr October 1956 through March 1957. A "contour length index" and a "trough index" w developed to measure the degree of disturbance of the 300 mb circulation over western No America and the eastern Pacific Ocean and the intensity of troughs in this circulation. Th trough classifications were defined and the development of all troughs appearing in the Aleut Island-Gulf of Alaska area were analyzed by class. The results suggest that troughs wh appeared in the Aleutian Island-Gulf of Alaska area a few days after an abrupt increase geomagnetic activity subsequently developed a stronger average cyclonic curvature than ot troughs. The largest trough developments and the maximum contour lengths occurred, the average, eight to nine days after the magnetic disturbance. Added studies will be nee to determine whether the suggested relationships are general ones. *Subject Headings:* **1. G magnetic disturbances—atmospheric circulation relationships 2. Trough formation 3. Cir lation indexes 4. Western North America 5. Eastern Pacific.**—*Authors' abstract.*

10.11–155 551.513.1:551.524.77:551.

Defant, Friedrich and Taba, Hessam, **The details of wind and temperature field and generation of the blocking situation over Europe Jan. 1 to 4, 1956.** *Beiträge zur Physik Atmosphäre*, Frankfurt a.M., 31(1/2):69–88, **1958.** 13 figs., 4 refs. German ,English a French summaries p. 69–70. **DWB, DLC**—In previous studies (*see* 9.8–150, Aug. 1958, a 10.3–23, March 1959, *MAB*), the authors showed that atmospheric analysis of the tropopa height and the tropopause temperature described the nature and behavior of the subtrop jet while moving progressively towards more northerly latitudes over the Atlantic Ocean Western Europe, and that several similar developments in different parts of the earth play important role for the generation of zonal circulation types later on. In this paper the auth present the detailed structure of such a subtropical intrusion by means of vertical cross sectio and vertical wind and temperature distributions over Europe. Five schematic pictures sh

the principal features of these developments on Jan. 1 (Valentia to Berlin), Jan. 3 (Valentia to Stockholm), Jan. 3 (Aldergrove to Vienna) and Jan. 4, 1956 (from Angmagssalik, Greenland, across Europe to Italy and to North Africa). It is shown "that a sharp distinction can be made between the polar front jet and another jet phenomenon usually referred to as the subtropical jet." "The subtropical jet or a branch of it, meanders exceptionally far northward over the Atlantic Ocean and even enters Europe. The meandering behavior of the subtropical jet seems to be closely related to the formation of a blocking situation. The jets differ with respect to level of maximum wind and vertical wind distribution. The subtropical jet appears as a rather flat jet with sharp wind shear below and above; it is mostly restricted to a layer of 50 mb in the vertical." The vertical wind distribution of the polar jet contains in the troposphere a sharp increase of wind due to the intersection of the polar surface and a further, but slower, increase until the maximum is reached. "The wind decrease above the maximum is weaker than in the case of subtropical jet." The form and height of the tropopause, the structure of the polar front and subtropical jet, and their relation to breaklines or sharp discontinuous slopes in the tropopause level, and the importance of superposition on the approach of the two jets for cyclogenesis are discussed. *Subject Headings:* **1. Blocking situations 2. Subtropical jet stream 3. Vertical wind distribution 4. Vertical temperature distribution.**—*Authors' summary and I.L.D.*

10.11–156 551.513.1:532.5

Raethjen, P. (*Hamburg*), **Ähnlichkeitsbedingungen für geohydrodynamische Modellexperimente in rotierender Schale.** [Similarity conditions for geohydrodynamic model experiments in a rotating dish.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 10(2/3):178–193, **1958.** 2 figs., 40 eqs. German, English and French summaries p. 178–179. **DWB, DLC**—The application of similarity principles in technology is illustrated by the use of Reynolds and Froude numbers and the author points out that in technology the assumption of model experiments is always that the geometrical order on the small scale is necessarily similar to that of the large scale which has yet to be constructed. On the other hand, in the case of geophysical problems, the large scale model is already in existence while the small scale model must serve to explain a given field of the atmospheric or oceanic circulation. Hence, geometric similarity of limiting conditions and dynamic similarity of fields of flow guarantee together the geometrical similarity of flow fields (stream lines) but only geometrical similarity of the limiting conditions and of the stream line alone does not guarantee the dynamic similarity of the fields. This is illustrated by the specific example of the flow of geometrically similar but dynamically dissimilar currents in a rotating disk. With the aid of equations and computed coefficients, the author discusses the geometrical and kinematic similarity condition for models in geophysical studies. These include the bending coefficient of the edge, coefficient of inclination of the layer and the Rossby number. The dynamic similitude conditions include the Reynolds number, the Froude number, and latitudinal differences of the Coriolis parameter. The stratification conditions comprise a baroclinicity characteristic and the Richardson number. The heat flow conditions involve the mixing length characteristic, heat requirement characteristic, and the heating problem. It is concluded that in order to fulfill all conditions for a suitable model a basin with a diameter of about 4 ms must be chosen and the heat transfer must be about 25 kg cal/sec in order to raise the temperature from 0° to 30°C in a second. *Subject Headings:* **1. Rotating dishpan models 2. Atmospheric circulation 3. Geohydrodynamic models.**—*I.L.D.*

10.11–157 551.513.1:551.547

†Scherhag, R. (*Inst. of Met. & Geophy., Free Univ., Berlin*), **Probleme der allgemeinen Zirkulation.** [Problems of the general circulation.] *Geophysica*, Helsinki, 6(3/4):539–557, **1958.** 3 figs., 5 tables, 29 refs. German and English summaries p. 539–540. **DWB, DLC**—The mean contour and thickness charts prepared at the Meteorological Institute of the Free University, Berlin, during the last years are supplemented by a mean Southern Hemisphere 1000 mb contour map. Furthermore, the contour deviations from Southern Hemisphere latitudinal averages and the height changes of the 1000 mb surface between July and January are discussed. Thus it becomes possible to calculate the annual exchange of air masses between different latitudes. It is apparent that the thermal influences by far outweigh the dynamical processes

within the tropical regions equatorward of 40° lat. Therefore, the classical concept of th circulation within the trades region remains valid and should not be replaced by new theori not sufficiently substantiated. *Subject Headings:* **1. General circulation 2. Mean pressu charts 3. Southern Hemisphere charts.**—*Author's abstract.*

ATMOSPHERIC DISTURBANCES

See also: **Cyclonic swell** (Bernard), 10.11–57; **Large scale circulation associated with cyclogenesis** (Saylor, Caporaso), 10.11–152; **Pressure disturbance effect on water level** (Harris), 10.11–175; **Frontal clouds** (McEwan), 10.11–218.

10.11–158 551.515:551.553.21(549.

Sinha, K. L. (*Met. Office, Jodhpur*), **Influence of distant monsoon lows on weather ov Jodhpur.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(3):251–254, July 195 table, ref. **DWB, DLC**—The three main zones of air circulation in Jodhpur, West Pakista are: the innermost zone of dry air, a zone of comparatively moist air and one of very mo monsoon air. These three zones are described and their effects on the area weather are illu trated. *Subject Headings:* **1. Monsoon depressions 2. Monsoon circulation 3. Monso effects on weather 4. Jodhpur, Pakistan.**—*N.N.*

10.11–159 551.515.1(26

Clark, John R. and French, William O. (*both, Natl. Weather Analysis Center, U. S. W. Wash., D. C.*), **Some interesting aspects of a subtropical depression.** *Monthly Weather Revie* Wash., D. C., 86(5):186–196, May **1958.** 12 figs., 4 refs. **Comment** by Eugene W. Hoov *Ibid.*, 86(9):333–334, Sept. **1958. DWB**—During the period May 18–28, 1958 a subtropic depression formed in the Caribbean Sea and moved north-northeastward parallel to the ea coast of the U. S. The Low became extra-tropical and continued northward west of Greenlan This system had many interesting features. It gave heavy rains to the Miami area causi some local flooding. It had all the prospects of becoming a full scale hurricane but the win never even reached storm speed (greater than 38 m.p.h.) until after the depression becan extra-tropical. As this occurred, the Low's vertical structure was peculiar. These points a others are discussed in this article. *Subject Headings:* **1. Extratropical cyclones 2. Subtropic depressions 3. Cyclone development 4. North Atlantic.**—*Authors' abstract.*

10.11–160 551.515.127:551.524.

Pogosian, Kh. P., **Izmenenie temperatury vozdukha v sisteme razvivaiushchegos tsiklona.** [Atmospheric temperature change in a developing cyclone system.] *Meteorolog i Gidrologiia*, Leningrad, No. 1:3–8, Jan. **1956.** 3 figs., 3 tables, ref. **DWB, DLC.** Tran into English available Special Libraries Association Translation Center (John Crerar Libra Chicago) as its R-49.—The nature of temperature change in a moving and developing pressu system is analyzed and explained by calculating the values of advective and adiabatic te perature changes in the system of individual deepening cyclones. The former were determin graphically with the aid of charts of isobaric surfaces of 850, 700 and 500 mb through 12 intervals, the latter according to the method of G. I. Morskoi. Data are given as the chan of the relative geopotential and of surface pressure above the surface center of a cyclone a in a system of cyclones through 12 hr intervals for a given synoptic period and on the amou of daily fall of mean temperature in the 500–1000 mb layer over the surface center of cyclon *Subject Headings:* **1. Cyclone dynamics 2. Temperature variations in a developing cyclon** —*I.L.D.*

10.11–161 551.515.13:551.465:551.311.184: 551.583.15(9

†Girs, A. A. (*Arctic Research Inst., Leningrad*), **Vzaimosviaz' protsessov v atmosfer gidrosfere.** [Interrelation of processes in the atmosphere and hydrosphere.] **(1956).** 41 26 charts, 26 refs. Carbon of typescript. Also: Trans. from the Russian by Nina S. Zike (In: **The Dynamic North.** Wash., D. C. Technical Assistant to Chief of Naval Operatio for Polar Projects, 1956–. Vol. 1, Pt. 15, **1956.** Looseleaf. 45 p. 26 figs., table, 11 ref

DWB—An attempt is made by means of a study of cyclone, anticyclone and air mass types, wave motion, etc. to show that the general circulation of the polar and temperate regions affects the ocean currents, which in turn affect the ice movements and hence the temperature, pressure and wind over the Arctic, and thus the climate itself (when considered over a period of years). The approach is synoptic-dynamic-statistical. The charts representing the circulation types (VANGENHEIM, 1939) and the resulting circulation patterns for the Northern Hemisphere down to lat. 45° are attached. *Subject Headings:* **1. Arctic synoptic meteorology 2. Arctic circulation types 3. Ocean-atmosphere interactions 4. Arctic. I. Zikeev, Nina (Stepanova).** —*M.R.*

10.11–162 551.501.81:551.515.2

§Kessler, Edwin, III (*A. F. Cambridge Research Center*), **Eye region of hurricane Edna, 1954.** *Journal of Meteorology*, Boston, 15(3):264–270, June **1958.** 7 figs. (incl. photos), table, 8 refs. **DWB, DLC**—The eye region of Hurricane "Edna" (1954) is studied with the principal aid of radar and dropsonde data. Vertical sections show that over the eye there was a thick layer derived from the wall cloud which bounded the eye on the northeast. Precipitation fell from this upper layer into drier air beneath. A reasonable mechanism is thereby suggested by which large moisture values can become associated with air in the eye without producing the wet bulb potential temperatures or high winds characteristic of the rain-filled masses outside the eye. Radar data giving the height of the "bright band" or melting level show that the warm core structure of "Edna" was most pronounced within the radius of maximum surface winds. This result is qualitatively confirmed by soundings and by comparison of surface winds and the speeds of radar weather elements in various portions of the storm. The radar photographs also show that heavy precipitation near the eye of "Edna" was bounded sharply in the western semicircle along an east-west line through the center of the storm. This boundary must be associated with a rather large change of vertical air speeds and therefore has special dynamic significance. *Subject Headings:* **1. Eye of hurricanes 2. Hurricane "Edna" (1954) 3. Radar observation of hurricanes.**—*Author's abstract.*

10.11–163 551.515.2:551.577(759)

Miller, Banner I. (*Weather Bureau Office, Miami*), **Rainfall rates in Florida hurricanes.** *Monthly Weather Review*, Wash., D. C., 86(7):258–264, July **1958.** 8 figs., 9 refs. **DWB, DLC**—Hourly rainfall amounts from 16 hurricanes are plotted relative to the center of the storm to obtain the mean areal rainfall rates around the storm. The rates ahead of the center are greater than those to the rear, but the differences in rates between the right and left sides are not large. The frequency distributions of various hourly amounts are tabulated for stations within about 100 miles of the center. Finally, the latent heat of condensation is calculated from the mean areal rainfall data. This is found to be about 6×10^{26} ergs per day. *Subject Headings:* **1. Hurricane rainfall data 2. Florida.**—*Author's abstract.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Air showers** (Galbraith), 10.11–11; **Solar radiation** (Foitzik, Hinzpeter), 10.11–13; **Radiation flux** (Coulson), 10.11–21; **Photometer obs. of airglow** (Roach), 10.11–32; **Effect of vernalization on rye culture** (Listowski), 10.11–78; **Photosynthetic activity of conifers** (Roussel), 10.11–82; **Nocturnal luminescence** (Barbier), 10.11–254.

10.11–164 551.521.3:551.511.2

†Murgatroyd, R. J. (*Met. Office, London*) and Goody, R. M. (*Imperial College, London*), **Sources and sinks of radiative energy from 30 to 90 km.** *Royal Meteorological Society, Quarterly Journal*, London, 84(361):225–234, July **1958.** 5 figs., 3 tables, 27 refs., 3 eqs. **DWB, DLC**—The absorption of solar radiation and the exchange of long-wave terrestrial radiation are computed for the 30 to 90 km region for all latitudes using the climatological mean tem-

peratures given by MURGATROYD (*see* 9.2–27, Feb. 1958, *MAB*). Over most of the earth surface (approximately 30° in the winter hemisphere to 60° in the summer hemisphere) there is a close approach to radiative equilibrium at all the levels considered. In the polar regions however, there is a significant departure from radiative equilibrium with excess heating during the summer and excess cooling during the winter. *Subject Headings:* **1. Radiative equilibrium 2. Heat sources and sinks 3. Atmospheric absorption.**—*Authors' abstract.*

10.11–165 551.521.3:551.576

Otani, K. (*Nagoya Local Met. Obs.*), **Measurement and estimation of atmospheric radiation in clear and cloudy skies.** *Geophysical Magazine*, Tokyo, 27(4):533–542, Dec. **1956.** 6 figs 4 tables, 9 refs., 7 eqs. **DWB, DLC**—Observations of atmospheric radiation by the Linke Feussner type radiometer were carried out at Fukuoka from February to March, 1955. The observed values are in fairly good agreement with the values computed by the Yamamoto chart, for clear skies as well as cloudy skies. Dependence of the net flux and the flux divergence in the atmosphere upon the cloud height is examined by means of a radiation chart. It is found that the net flux at the surface increases with the cloud height at the rate of 0.0005 to 0.01 cal cm^{-2} min^{-1} per kilometer. And it is also shown that the cooling rate of the atmosphere in a fully overcast sky decreases to 0.0–0.5°C per day at the lower level of the troposphere while it amounts to about 1.5°C per day in clear sky. *Subject Headings:* **1. Atmospheric radiation 2. Radiation variations 3. Cloudiness effects on radiation.**—*Author's abstract.*

10.11–166 535.43:551.521

Piaskovaskaia-Fesenkova, E. F., **Issledovanie rasseianii sveta v Zemnoĭ atmosfere** [Study of light scattering in the earth's atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Seriia Geofiz.*, No. 12:1533–1534, Dec. **1957.** Doctoral dissertation defended in the Akademiia Nauk SSSR, March 23, 1957. **DLC**—The aim of this dissertation was to investigate the scattering of light on the basis of extensive observations of the clear sky by day; observations were made chiefly in a very clear atmosphere in the visible spectrum in the absence of snow cover. The visual photometer of the daylight sky and the photoelectric aureole photometer of V. FESENKOV were used. The well known formula of sky brightness involving light scattering of the first order only is analyzed. For a given coefficient of atmospheric transparency the brightness of the sky was determined by means of two functions—that of light scattering and zenithal distance of the sun, and the observed point of the sky. A method is developed for determining the brightness of a clear daylight sky at any point by measuring the brightness along the almucantar of the sun. Indices of dispersion, obtained from the observed brightness of the sky, calculated for the entire height of the atmosphere, are presented. A method is proposed for determining atmospheric indices independent of the repeated scattering of light. The various procedures used in this dissertation are described. *Subject Headings:* **1. Light scattering 2. Sky brightness measurements 3. Atmospheric scattering.**—*I.L.D.*

TEMPERATURE

See also: **International temp. scale** (Kosiba), 10.11–92; **Upper air temp. data processing,** 10.11–93; **Homogeneity of temp. data** (Birkeland), 10.11–97; **Minimum temp. measurement** (Sudakevich), 10.11–101; **Rate of adiabatic variation of temp. . . .** (Dufour), 10.11–146; **Wind and temp. distribution in a blocking situation, Europe** (Defant, Taba), 10.11–155; **Temp. changes in cyclogenesis** (Pogosian), 10.11–160; **Long range temp. forecasting, Macquarie Is.** (Loewe), 10.11–173; **Snow-air temp. relationships** (Dobosi), 10.11–223; **Snow-air temp. relationships** (Kirigin), 10.11–225.

10.11–167 551.524:551.588.7(5

Fukui, E. (*Dept. of Geography, Tokyo Kyo-iku Univ., Tokyo*), **Increasing temperature due to the expansion of urban areas in Japan.** *Meteorological Society of Japan, Tokyo, 7th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 336–341. 3 figs., 12 refs. **DWB, DLC**—For the study of increasing temperature due to the development of urban areas, the character of the available data should be thoroughly investigated with respect to its homogeneity

variability of the elements under consideration, and the effect of regional climatic change. City growth is numerically expressed by the increase of population. Of 18 stations in Japan, 14 were selected (Nagoya, Kyoto, Kobe and Hiroshima were excluded, mainly because of dishomogeneity of their temperature records due to a location change of the stations). The increase of temperature is more closely related to the square root than to absolute population number. *Subject Headings:* **1. Urban temperatures 2. Homogeneity of data records 3. Japan.**—*From author's abstract.*

10.11–168 551.524(58)

*Kolesnikova, V. N., **Temperaturnyĭ rezhim v nizhnem kilometrovom sloe atmosfery v Toĭ-Tiube.** [The temperature regime in the lowest km layer of the atmosphere at Toy-Tyub.] *Akademiia Nauk UzSSR, Izvestiia, Ser. Fiziko-Matematich..Nauk*, No. 4:65–75, **1957.** 4 figs., 4 tables, 15 refs.—This study of the vertical temperature regime during different synoptic conditions over Central Asia is based on thousands of balloon observations made on clear days. Mean monthly vertical temperature profiles for each period were constructed and daily temperature variations were analyzed by month and season. With the aid of data presented in tables, the author discusses the daily variation of temperature with increasing elevation from 2 to 800 meters and vertical distribution of temperature gradients. *Subject Headings:* **1. Vertical temperature variations 2. Temperature regime 3. Central Asia.** —*I.L.D.*

10.11–169 551.311.1:551.524 551.311.1:551.571

†Konovodov, B. P., **Vliianie vodoemov na temperaturu i vlazhnost' vozdukha nad nimi pered zamerzaniem i ochishcheniem.** [Influence of water reservoirs on air temperature and humidity prior to freeze-up and break-up.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 58:63–100, **1957.** 10 figs., 6 tables, 29 refs. **DLC, DWB**—A brief summary is presented of studies on the influence of water reservoirs upon the temperature and humidity of the atmosphere above a water surface. This is followed by an extensive investigation of the influence of the Rybinsk Reservoir, the Kliaz'minsk Reservoir of the Moscow canal, Tsimlyansk Reservoir, etc., upon the temperature and humidity preceding the formation of ice when the water temperature reaches 4°C, based upon data of weather stations situated along the banks further inland and within the reservoir itself. The temperature change of the air (Δt) was investigated as a function of the temperature of the water (T) in the reservoir and air temperature on dry land (t) at 0100, 0700, 1300 and 1900 o'clock, $\Delta t = f(T-t)$; and the variation of absolute humidity Δe was studied as a function of the maximum water vapor tension (E) of saturated air at a given water temperature and absolute atmospheric humidity for the usual observation periods, $\Delta e = \varphi(E-e)$. A detailed description of the observational procedure for the various reservoirs, the detailed field observations made at the Tsimlyansk Reservoir, etc., are presented. In the case of the Tsimlyansk Reservoir, the reservoir alters the air temperature by several degrees. The differences in temperature over dry land and over water may be considerable in spring when the reservoir surface is covered with ice. The influence of fetch, wind velocity, etc. upon the temperature and absolute humidity, and the temperature and humidity measured are presented in tables and graphs for individual reservoirs, and the use of theoretical formulas for determining the temperature and humidity of the air over reservoirs with the aid of a nomogram is illustrated. *Subject Headings:* **1. Temperature-humidity over reservoirs 2. Temperature-humidity over ice fields 3. Freezing water effects on temperature 4. Freezing water effects on humidity 5. Tsimlyansk Reservoir, U.S.S.R.** —*I.L.D.*

10.11–170 551.524.31(99)

Rouch, Jules, **La variation diurne de la température en hiver dans l'Antarctique.** [Diurnal variation of temperature during winter in the Antarctic.] *Académie des Sciences, Paris, Comptes Rendus*, 248(8):1086–1087, Feb. 23, **1959.** ref. **DWB, DLC.** Values of air temperature observed by the expedition of the Argentine Republic during the winters 1955 and 1956 at General Belgrano station in the Antarctic. These observations show that during those periods of the year when the sun continually remains above the horizon, air temperature

in polar regions presents a peculiar diurnal variation. During the hours corresponding t night, temperature is higher than during the hours corresponding to day time. Its diurna variation has a single period, with a maximum at 2 or 3 a.m. and a minimum at 4 p.m. Th amplitude of this variation is 1.2°. It seems that this diurnal variation may be attributed t an influx of warm air coming from regions situated at a lower latitude. *Subject Heading* **1. Diurnal temperature variations 2. Antarctica.**—*A.V.*

SOIL TEMPERATURE

See also: **Soil temp. of cotton field** (Zuev), 10.11–19.

10.11–171 551.525.4(497.1

*Yugoslavia. Hidrometeorološka Služba, **Godišnjak temperature zemljišta** [Yearboo of soil temperature], 1956. Issued Belgrade, **1958.** 103 p. Almost entirely tables. **DWB**— This yearbook includes the list of the Yugoslav agrometeorological stations with their geo graphical co-ordinates. It gives the daily observations of soil temperature made at 86 station during the year 1956. Most of those stations make three observations a day (7, 14 and 21h at the depths: 2, 5, 10, 20, 30 and 50 cm. *Subject Headings:* **1. Soil temperature data 2. Yugo slavia.**—*A.V.*

WATER TEMPERATURE

See also: **Wind effects on water temp.** (Berenbeĭm), 10.11–199.

10.11–172 551.526.6(26

Knauss, John A. (*Scripps Inst. of Oceanog., Univ. of Calif., La Jolla*), **An observation of a oceanic front.** *Tellus*, Stockholm, 9(2):234–237, May **1957.** 4 figs., table, ref., eq. **DLC**— A detailed temperature section across an oceanic front in the eastern Equatorial Pacific described. The frontal zone was moving at about one knot from the colder water toward th warmer water. The temperature difference across the front was 5°F. In the temperatur section it is possible to see the cold water overrunning the warm water and creating an unstab zone approximately 100 yds wide. *Subject Headings:* **1. Oceanic front 2. Water temperature 3. Eastern Equatorial Pacific.**—*Author's abstract.*

10.11—173 551.526.6:551.509.33:551.524.3(26

Loewe, Fritz (*Dept. of Meteorology, Univ. of Melbourne*), **A note on sea water temperatur at Macquarie Island.** *Australian Meteorological Magazine*, Melbourne, No. 19:60–61, De **1957.** table. **DWB, DLC**—Comparing mean monthly 9 a.m. sea surface temperatures Macquarie Island for 1912–14 with those for 1951–54 shows a marked warming, especiall in summer, in the second period compared with the first. The observations were made in th same place. A close correlation exists between air and water temperatures at Macquarie Islan (+0.61 with o=.46°C for water and .74°C for air temperature). No good correlation can found, however, between seasonal water temperatures at Macquarie Island and air temper tures at Hobart (1912–15) or Cape Bruni and Invercargell, New Zealand (1951–54), so it doubtful if sea temperature anomalies can be used to predict simultaneous or subsequent a temperature at Tasmania or New Zealand. *Subject Headings:* **1. Sea surface temperatu variations 2. Long range temperature forecasting 3. Macquarie Island.**—*M.R.*

10.11–174 551.526.6:57(261)(71

*Quebec. Dépt. des Pêcheries. Station de Biologie Marine, **Rapport Annuel** [Annu Report], **1953.** issued, **1954.** 147 p. figs., charts, 44 tables.—Most of the work reviewed this report is of a marine biological nature, dealing specifically with fish and fisheries. C p. 139–145 is an appendix dealing with the temperature of surface waters at Grande Rivièr Baie-des-Chaleurs and Gros-Cap, Iles-de-la-Madeleine, comprising a table of daily wat temperatures from April 13–Dec. 1, 1953. A graph shows the daily course in water tempe tures at Grande Rivière, Quebec, during the open season. *Subject Headings:* **1. Bay te peratures 2. Marine biological stations 3. Grande Rivière, Quebec.**—*M.R.*

PRESSURE AND WIND

PRESSURE

See also: **Pressure effects on currents, Straits of Gibraltar** (Lacombe, Lizeray), 10.11–58; **Air pressure microvariograph** (Buben), 10.11–112; **Synoptic conditions for pressure changes** (Reuter), 10.11–123; **Mean pressure charts** (Scherhag), 10.11–157; **Wind evaluation from contour charts** (Zobel), 10.11–203.

10.11–175 551.541:551.515.8:551.481

Harris, D. Lee (*Special Projects Section, U. S. W. B.*), **The effect of a moving pressure disturbance on the water level in a lake.** *Meteorological Monographs*, Boston, 2(10):46–57, June 1957. 10 figs., 9 refs., 21 eqs. **DWB, DLC**—Seven persons were drowned by a sudden and unexpected rise in the level of Lake Michigan along the Chicago shore line on 26 June 1954. It has been suggested by other authors that the large amplitude of this disturbance was due to resonant coupling between a moving pressure jump line and the lake. The meteorological and limnological data associated with this disturbance are presented, and the theory of resonant coupling between a moving atmospheric disturbance and the water level in a canal of uniform cross section is examined in an effort to evaluate this hypothesis. It is found that the effect of the moving pressure disturbance was between 2.5 and 7 times as great as the effect of the moving band of high winds associated with the pressure rise. It was also determined that the available data and theory support the reasonableness of the hypothesis, but are not sufficient to establish it beyond a reasonable doubt. *Subject Headings:* **1. Pressure jump line 2. Pressure effects on water level 3. Lake Michigan.**—*Author's abstract.*

10.11–176 551.541:551.558.21

Palm, Enok, **Two-dimensional and three-dimensional mountain waves.** *Geofysiske Publikasjoner*, Oslo, 20(3), May 1958. 25 p. 7 figs., 16 refs., numerous eqs. **DLC, DWB**—In Ch. I of this paper, two-dimensional atmospheric waves behind a mountain ridge are discussed. Sec. 1 contains a nonmathematical description of the creation of lee waves. In Sec. 2, 3, and 4, models with a velocity and stability distribution which approximate the observed data, are discussed. It has been possible in two cases to compare the computed wave lengths with those observed in the Sierra Nevada region and in both cases good agreement is found. The streamline and pressure field due to the resonance waves have been drawn for one of these. Ch. II contains a discussion of three-dimensional waves generated by a mountain top. The basic velocity is assumed to increase linearly with height in the troposphere and to be constant in the stratosphere. The stability is assumed constant in the troposphere as well as in the stratosphere. Isolines for the vertical velocity have been computed and drawn in a numerical example. *Subject Headings:* **1. Lee waves 2. Three-dimensional mountain waves.** —*Author's abstract.*

10.11–177 551.541:551.558.21

Scorer, R. S. and Klieforth, H. (*both, Imperial College, London*), **Theory of mountain waves of large amplitude.** *Royal Meteorological Society, Quarterly Journal*, 85(364):131–143, April 1959. 8 figs., 12 refs., 7 eqs. **DWB, DLC**—Rotors are defined as regions containing flow in the opposite direction to the main stream and are shown to exist when the wave amplitude is large enough. Equations are derived for computing rotor flow in an infinitely deep atmosphere. The problem of choosing an appropriate second boundary condition in steady flow over a ridge is complicated when the amplitude is finite because the shape of obstacle obtained depends on the airstream characteristics as well as upon the mathematical form given to it. Probably under some actual conditions the oncoming airstream is modified by the presence of the mountain. Because of the great variety of airstreams and mountains, no general case can be illustrated. The particular cases chosen illustrate rotor flow. These particular cases do, however, each represent a set of cases in which all the nondimensional numbers involved have the same value. Known cases of rotors in the Sierra Nevada and at Cross Fell are cited to illustrate the theory. *Subject Headings:* **1. Lee waves 2. Rotor clouds 3. Sierra Nevada, Calif.**—*Authors' abstract.*

WIND

See: **Wind measurement techniques** (Křivský), 10.11–88.

GUSTINESS AND TURBULENCE

See also: **Clear air turbulence forecasting** (Harrison), 10.11–72; **Turbulence analysis** (Stewart et al.), 10.11–96; **Drag effect on surface wind** (Deardorff), 10.11–184; **Contrail dissipation and high level turbulence** (Clodman), 10.11–216.

10.11–178 551.551:551.55

Ely, Robert P., Jr. (*Geophysics Research Directorate*), **Vertical gustiness up to 1200 meter as derived from smoke puff trajectories.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*) **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:373–376 fig., 2 tables.) **DWB**—An attempt to determine the significant features of the distributio of vertical movements of smoke puffs and to detect the principal causes of these features. Th means and standard deviations of the vertical velocities are presented in a table. From a analysis of the data it is concluded that the "variance of the vertical component of air motio as derived from the vertical displacement of smoke puffs over horizontal trajectories of severa hundred meters illustrates the thermal character of the vertical gustiness on clear days in th range from 100 to 1200 m above the ground." The standard deviations of vertical motion a derived from smoke puff trajectories are compared with those measured by PBY flights and high degree of similarity between them is noted. *Subject Headings:* **1. Smoke puff trajectorie 2. Vertical wind velocities 3. Vertical gustiness.**—*I.L.D.*

10.11–179 551.551:551.511

Obukhov, A. M. and Iaglom, A. M. (*both, Inst. for Physics of the Atmosphere, Moscow*) **On the microstructure of atmospheric turbulence: a review of recent work in the U.S.S.R** *Royal Meteorological Society, Quarterly Journal*, 85(364):81–90, April **1959.** 5 figs., 27 refs 18 eqs. **DWB, DLC**—Owing to turbulence, the instantaneous distribution of wind velocity temperature, humidity and other meteorological elements is of a very complicated characte the elements at different points undergoing random and often very considerable fluctuation Similarly, the values of the same elements at a fixed point and at different moments are cha acterized by random fluctuations having a very wide spectrum. Space and time fluctuation of meteorological elements are of general geophysical interest since they characterize atmo pheric turbulence which is one of the most important features of atmospheric motion. Mor over, the study of fluctuations has an applied significance as one needs to know the statistic characteristics of fluctuations for the determination of the rate of the turbulent exchange in th surface layer, for the theory of meteorological instruments and for a number of problems atmospheric optics, atmospheric acoustics and radiometeorology. Because of their wi spectrum (both in space and time) the methods of study of these fluctuations vary accordin to the particular part of the spectrum which we are interested in. Here we shall mainly de with the problem of small-scale turbulence (of the microinhomogeneities of the atmosphe fields) which are characterized by periods of a few hundredths of a second to some secon and space scales of a few decimetres to some metres. Our consideration will mostly refer the surface layer which has been studied most. In the U.S.S.R. a number of theoretical a experimental investigations concerning the microstructure of the principal meteorologic fields, mainly those of wind velocity and temperature, have recently been carried out. T results of these investigations are in satisfactory agreement. Simultaneously some spec problems of the physics of the atmosphere using the above-mentioned results have been trea A brief review of all the investigations is given. *Subject Headings:* **1. Microstructure of tu bulence 2. Turbulence spectra.**—*Authors' abstract.*

10.11–180 551.551:551.511

Obukhov, A. M., **Sovetskie raboty v oblasti izucheniia atmosfernoĭ turbulentnos** [Soviet work in the field of atmospheric turbulence research.] *Akademiia Nauk SSS Izvestiia, Ser. Geofiz.*, 11:1389–1392, **1957.** 3 foot-refs. **DWB**—The foundations of Sov

research on atmospheric turbulence were laid by the theoretical work of A. A. FRIDMAN and L. V. KELLER in their papers on the **Differential equations for the turbulent movement of compressible fluids** and **Establishment of a system of characteristics of atmospheric turbulence** delivered before the First Congress of Applied Mechanics at Delft (Netherlands) in 1924. In the 20's, these authors began extensive computational work to determine correlation functions for various meteorological elements on the basis of network data. During the 30's E. E. SLUTSKIĬ, A. IA. KHINCHIN, and A. N. KOLMOGOROV made significant contributions to mathematical theory of turbulence. In 1941 KOLMOGOROV developed the theory of local isotropic turbulence, and his work is of basic importance in the study of the microstructure of meteorological fields. At present, various scientific institutes (Central Geophysical Observatory, Institute of Atmospheric Physics of the Academy of Sciences of the U.S.S.R., etc.) are engaged in studies on the effect of turbulence upon airplanes, on the work of wind machines, on propagation of sound in the atmosphere, etc. Also, Soviet work on turbulent exchange in the atmospheric layer near the ground, the work on evaporation and heat balance, etc. are summarized briefly. *Subject Headings:* **1. Soviet turbulence research 2. Atmospheric turbulence research 3. U.S.S.R.**—*I.L.D.*

10.11–181 551.551:595.72

Rainey, R. C. (*Desert Locust Survey, East Africa High Commission*), **Some observations on flying locusts and atmospheric turbulence in eastern Africa.** *Royal Meteorological Society, Quarterly Journal*, 84(362):334–354, Oct. **1958.** 8 figs., 44 refs. **DWB, DLC. Discussion** by F. H. Ludlum; R. S. Scorer et al., *Ibid.*, 83(364):171–173, April **1959.**—Desert locusts (*Schistocerca gregaria Forskål*) are observed in swarms of widely varying structure, ranging from dense stratiform swarms a few feet thick to attenuate cumuliform swarms thousands of feet thick, the structure and density depending on the convective activity or stability (density ranges from 10 locusts/m^3 to .001/m^3). Two airplane observation (APOB) records (Jan. 12, 1954 and Aug. 23, 1952 near Wajer, Kenya and Burao, Somaliland) during such locust swarms show dry or superadiabatic lapse rates up to exact level of top of locust swarm, whereas the most extreme stratiform case (Feb. 1952 in Wajer District, Kenya) with locusts flying at 20 ft above ground, was during isothermal condition. Gliding pilots in Transvaal confirm these observations. Vertical (convective turbulence) motions were calculated from 2 special theodolite or tailed pilot balloon observations made in Somalia in 1947 and 1948 in proximity to flying swarms. Data are shown graphically, along with data from a counting accelerometer on an Auster JI and JIb aircraft. Gust spectra show that about 10% of the locusts in a swarm rise faster during the day than they can glide down, but there are also downward motions in swarms. Horizontal extent of updrafts couldn't be determined. Use of locusts to study air currents is suggested. Comparison of observed locust structure and motion with inert dust cloud motion is made on a semi-quantitative basis, showing that strong cohesive forces must operate in the swarm in opposition to the natural dispersive (turbulent) forces. Photographic studies are being made to verify tentative results reported in this paper. During precipitation (10 cases) all swarms were stratiform. Large swarms all fly downwind with speed of wind whereas small swarms fly slower than wind, but are kept intact for great distances and periods of time. *Subject Headings:* **1. Locust swarm structure 2. Air current observation from locusts 3. Turbulence observation from locusts 4. East Africa.**—*M.R.*

10.11–182 551.551:533.16

Staley, D. I. and Horn, L. H. (*both, Dept. of Meteorology, Univ. of Wis., Madison*), **A numerical experiment with wind variations in the planetary boundary layer.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):328–338, **1958.** 5 figs., 2 refs., 16 eqs. English, German and French summaries p. 328. **DWB, DLC**—The equations of motion applied to the planetary boundary layer are numerically integrated for certain special eddy viscosity distributions. Accelerations are retained, eddy viscosity varied with height and, to a lesser extent, with time. The resulting inertial oscillations, although very limited in generality, show agreement with observations. Not only clockwise but also counterclockwise rotation of the end point of the wind vector can occur in some cases. Some solutions agree and others disagree with the analytical solutions for unbounded eddy viscosity. *Subject Headings:* **1. Eddy viscosity 2. Equations of motion.**—*Authors' summary.*

10.11–183 551.511.6:551.551.25:551.508.5

Vehrencamp, J. E. (*North American Instruments, Inc., Altadena, Calif.*), **Measurement of boundary shear stress.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:99–103. table, 8 refs., 3 eqs. **DWB**—Various methods of shear stress measurements at the earth's surface are described briefly and a more detailed account is given of the instruments used to measure directly boundary shear stress at O'Neill. These consisted of a device essentially a duplicate of SHEPPARD's (used by Johns Hopkins University group) and of a turf sampler, whose position was controlled by an automatic electro-mechanical regulator (used by the University of California group). The results of comparisons between measurements made with these instruments are presented in a table. The incompatibility between mean wind speeds and mean shear stresses is demonstrated by computation, showing that the effect of using mean wind speeds in the evaluation of surface stress instead of the root mean square wind speed may result in variations as great as 14%. *Subject Headings:* **1. Shear stress 2. Shear stress meters 3. O'Neill, Nebr.**—*I.L.D.*

HORIZONTAL DISTRIBUTION AND WIND VARIATION

See also: **Monsoon circulation** (Sinha), 10.11–158; **Vertical wind variation effects on mountain waves** (Döös), 10.11–207.

10.11–184 551.552:551.55

Deardorff, James W. (*Univ. of Wash.*), **The average slope of the surface wind.** *Journal of Meteorology*, Boston, 15(3):334–335, June **1958.** fig., table, 3 refs., 2 eqs. **DWB, DLC**—The object of this brief theoretical discussion is to demonstrate how the average slope of the streamlines, in the presence of a Reynolds stress, will exceed the slope of the surface approximately tantamount to the coefficient of resistance or coefficient of drag. *Subject Headings:* **1. Drag effect on surface wind.**—*W.N.*

10.11–185 551.552:551.553(436.14

*Dirmhirn, Inge (*Vienna*), **Fortsetzung der Windvergleiche von Wien und Obersiebenbrunn.** [Continuation of a comparison between winds in Vienna and Obersiebenbrunn.] *Wetter und Leben*, Vienna, 9(1/2):10–14, **1957.** 2 figs., table, ref. **DLC**—Comparative measurements of wind conditions at the Hohe Warte (Vienna) and in Marchfeld were continued for the period June 1954–December 1955. Mean wind velocities averaged by direction and frequency of wind direction and hourly wind velocities, generally remained the same as in the earlier study. The wind direction at Vienna and Obersiebenbrunn are analyzed with special reference to the relationship between wind direction and velocity. *Subject Headings:* **1. Wind velocities 2. Wind frequency data 3. Wind regime 4. Vienna, Austria 5. Marchfeld, Austria.**—*I.L.D.*

10.11–186 551.552:551.43:551.558.2

Long, Robert R. (*Johns Hopkins Univ., Baltimore*), **Tractable models of steady-state stratified flow with shear.** *Royal Meteorological Society, Quarterly Journal*, 84(360):159–16 April **1958.** 3 refs., 22 eqs. **DWB, DLC**—To simplify solution of problems of air flow over mountains and hills where the wind usually increases with heights, "tractable" models of shearing currents are constructed mathematically for the case of a density stratification and for $\beta=0$ (where β is one of the 4 constants), and a general model finally derived in the form

$$c=\left(\frac{\partial\psi}{\partial n}\right)=\left|\frac{d\psi\partial f}{df\partial n}\right|=\frac{1}{\rho^{\frac{1}{2}}}\left(\frac{\partial f}{\partial n}\right).$$

If ρ varies slowly, the speed is nearly proportional to the spacing of the f lines. *Subject Headings:* **1. Orographic effects on air flow 2. Mountain wave theories.**—*M.R.*

10.11–187 551.552:551.513.1:551.4

Musaelian, Sh. A., **O volnakh, porozhdaemykh gornym prepiatstviem v vozdushnom potoke (prostranstvennaia zadacha na sfere).** [Waves produced by mountain barriers i

atmospheric flow (special case of a sphere).] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 43(70):19–28, **1956.** 12 refs., 23 eqs. **DWB, DLC**—In this attempt to explain the disturbances in atmospheric flow produced by mountainous obstacles taking into account the sphericity of the earth, the radius of the earth is assumed to be 6.37×10^6 m, the angle of rotation 7.29×10^{-5}/sec. and the atmosphere is baroclinic. The movement of the atmosphere is considered as being a purely zonal circulation upon which disturbances produced by inequalities in the surface relief of the earth are superimposed. The processes taking place in the atmosphere are assumed to be dry adiabatic. The problem is solved by the method of long waves within the framework of linear theory. The vertical velocity component and vertical acceleration in the equation of motion are neglected. The equations of motion and of continuity are linearized relative to the west-east flow by the method of small fluctuations. The equations providing an analysis of the effects of mountainous obstacles upon the air circulation are derived. *Subject Headings:* **1. Orographic effects on air flow 2. Orographic influences on circulation 3. Mountain wave theories 4. Equations of motion.**—*I.L.D.*

10.11–188 551.553:551.557.3

*U. S. Air Weather Service, **Mean vector wind study for the specified levels for selected stations in the Northern Hemisphere.** May **1952.** 10 p. 3 tables. Also bound in, Its: **Maximum wind speeds at any level for selected stations and months.** May **1952.** 5 p. table. Also bound in, Its: **Maximum wind speeds and wind shears over the Northern Hemisphere.** May **1952.** 15 p. 5 tables (+tables for first article bound at end). photostat. **DWB**—The first paper constitutes a study based on upper air wind data for two observations a day for 20 selected stations over the N. Hemisphere, the selection being made without regard to type of equipment. The mean vector wind speeds are plotted in the form of cumulative percent frequency curves and frequency distribution histograms (or tables). Types of equipment are indicated wherever known and number and per cent of observations in each category for 40, 60, 80 and 100 thousand feet during Jan.–Dec. 1951 tabulated. In the second paper the maximum wind speeds at any level are given for 4 stations in the N. Hemisphere for 1942 to 1946 up to 1952. In the third paper the maximum wind speeds at the various standard levels, and the mean monthly latitude of the jet stream and wind shears over the Northern Hemisphere are tabulated and discussed. *Subject Headings:* **1. Mean vector wind charts 2. Maximum wind speeds 3. Northern Hemisphere.**—*M.R.*

10.11–189 551.553:621.311.24

*Frenkiel, J. and Zacks, S. (*both, Research Council of Israel*), **Wind-produced energy and its relation to wind regime.** *Research Council of Israel, Bulletin, Sec. A*, 6(3/4):189–214, April/July **1957.** 6 figs., 6 tables, 13 refs., numerous eqs. **DWB**—Data on wind speed, power, etc. for 4 wind power sites in Israel (Eilat, Mt. Cana'an, Tel Aviv and Misgav'Am for April 1953 to April 1954 are analyzed to determine which wind parameter is least correlated with the actual energy produced by the wind machine (output). The three methods tested were: 1) frequency distribution of hourly mean wind speeds; 2) wind power formulas; 3) graphical method. All three are discussed in general and with specific application to data for 4 sites in Israel. Regression lines (and equations) show remarkable agreement among the various methods so that the mathematical models are adequate for estimating energy. However, each site needs individual treatment, and mean wind speed appears to be the most reliable parameter to use. Derived data are presented in graphs and tables. *Subject Headings:* **1. Wind power-wind speed relationships 2. Israel.**—*M.R.*

VERTICAL DISTRIBUTION AND SPECIAL WINDS

See also: **Vorticity fields during cold air outbreaks** (Hsu), 10.11–147; **Equatorial westerlies** (Clarkson, Littlejohns), 10.11–151; **Wind analysis, Ukraine** (Buchinskiĭ), 10.11–245.

10.11–190 551.554 551.557 551.501.75

Chamberlin, L. C. (*Wright Air Development Center*); Barad, M. L.; Ely, R. and Lettau, H. H. (*all, Geophysics Research Directorate*), **Loeser technique of wind profile determination—daytime smoke-puff and night-time pibal swarm measurements.** (In: Lettau, H. H. and

Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, 195
Vol. 1:276–292. 12 figs., 2 tables, 3 refs., 4 eqs.) **DWB**—The development of a new techniq
for measuring the direction and speed of air motion simultaneously at a variety of levels
the lower 5000 ft of the atmosphere is described. The daytime smoke-puff method consis
of using a rack with 12 cartridges with "Composition No. 6" (40 parts magnesium, atomize
granulation 16; 55 parts sodium nitrate, 20 micron diameter; and 5 parts lanionac 446 mixtu
as binder) and a timing device; this rack was dropped from a helicopter and the timing devi
was adjusted to compensate for the acceleration of the falling rack to give reasonable equ
spacing of the 12 puffs. In nighttime wind profile measurement the "Pibal Swarm Techniqu
was developed. Eight to ten standard pilot balloons with light sources attached are spac
along the ground along a curved line into the upwind region in such a way so that when t
leased sequentially they form an equally spaced vertical line of approximately 1400 m as th
entered the vertical (cross wind) plane which defined the upwind limit of the common field
vision of the phototheodolite cameras. The authors present a detailed description of t
methods developed by LOESER, the phototheodolite triangulation method as applied
LOESER'S technique of wind profile measurements, and the application of the LOESER tec
nique at O'Neill. The data in Vol. 2 are discussed and the procedure of error analysis to t
measurements is outlined. *Subject Headings:* **1. Wind velocity measurement techniqu
2. Wind profile measurements 3, Smoke puffs trajectories 4. Pibal swarm techniq
5. Loeser technique.**—*I.L.D.*

10.11–191 551.554 551.556:622.24(479.2

*Goptarev, N. P., **Nekotorye rezul'taty gradientnykh issledovanii v raïone Neftiany
Kamneĭ.** [Results of investigation of gradients near Neftyanye Kamni.] *Moscow. Go
darstvennyĭ Okeanograficheskiĭ Institut, Trudy*, No. 36:128–157, **1957.** 11 figs., 10 tabl
17 refs., 8 eqs. **DWB**—The wind force upon marine oil drilling installations in the Apsher
marine district was investigated in 1954–1955, by means of a detailed analysis of the verti
distribution of wind velocities in the lower 50 m layer of the atmosphere. The gradie
installation was on a drilling tower, 50 m above sea level, located 22 mi from the nearest ba
The mean wind velocities were measured with electrical contact three cup anemomete
Velocity pulsations were measured with a low inertia brake anemometer with a 21 cup recei
and a potentiometer bridge. Details of measurement of wind direction, temperature a
humidity, calibration and the effect of the mast itself upon the readings, are discussed. T
results of measurements indicate the following: the vertical wind profile in the lower 50
layer of the atmosphere at velocities above 15 m/sec depends slightly upon stratification of
air and for practical purposes it can be described by the logarithmic law with a roughn
parameter of $Z_2=0.06$ cm. The wind gustiness in the atmospheric layer near the ground
irregular; the magnitude and duration of gusts vary within very wide limits. The me
magnitude of gusts in second intervals is 1.0–1.1 of the mean velocity for 10 min. The larg
gusts attain 1.6–1.7 of the mean velocity. The distribution of gust magnitudes in a w
current can be described approximately by the Gaussian curve. The relative wind gustin
($K=U_{max}/U_{mean}$) diminishes gradually with distance from the underlying surface. With
crease of velocity to 10–12 m/sec the relative gustiness begins to increase slightly. In sta
air the relative gustiness is greater than in unstable air as a result of slight vertical mixi
At high wind velocities the gustiness depends slightly upon stratification. The verti
variations of wind velocity in the Apsheron district are slight. The relevant equations
analyzing the gradient wind behavior and numerical data, and graphs are presented and
appendix contains tables with observations on vertical distribution of wind, temperature a
humidity in the Neftyanye Kamni district during 1954–1955, and mean wind velocities
10 min) as measured with the braked anemometer of D. IA. SURAZHSKIĬ (U) and extreme w
velocities in gusts for 10 min (U_{max} and U_{mean}). *Subject Headings:* **1. Wind profiles over
2. Gustiness data 3. Tower observations of wind 4. Wind load on structures 5. Off sh
oil industry 6. Neftyanye Kamni, Azerbaidzhan S.S.R.**—*I.L.D.*

10.11–192 551.555:632.

Countryman, Clive M. (*Calif. Forest and Range Experiment Station*) and Colson, De
(*Research Meteorologist, U. S. W. B.*), **Local wind patterns in Wildcat Canyon.** *U. S. Fo*

Service. California Forest and Range Experiment Station, Technical Paper, No. 28, Dec. **1958.** 12 p. 17 figs. **DWB** (634.9 U583t)—For a better understanding of fire behavior, fire control men need more detailed information about local wind conditions. To explore the problems concerned with providing this information through wind surveys, we laid out an intensive network of wind-recording instruments in a small canyon in San Diego County. The analysis reported here shows the kind of information that can be derived from such a survey. From the analysis we learned: 1. Ground conditions frequently exert a major control on wind patterns, only strong upper air patterns extend their influence to the surface. 2. Field studies of local wind patterns can identify problems for laboratory studies of air flow over topographic models to develop the basic laws controlling surface wind flow under various topographic and synoptic weather conditions. *Subject Headings:* **1. Local wind patterns 2. Local wind surveys 3. Forest fire control 4. Wildcat Canyon, Calif.**—*Authors' abstract.*

10.11–193 551.555.3

Krakhmal'nikova, M. I., **Iskliuchitel'nyĭ fen na chernomorskom poberezh'e Kavkaza.** [Unusual föhn on the Black Sea coast of the Caucasus.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:38, March **1958. DWB, DLC**—The föhn winds observed from April 15 to 17, 1957 were produced by the following atmospheric conditions. Cyclones from the Mediterranean moved to the Black Sea and farther to the northeast. Beyond the Caspian a deep anticyclone ridge brought dry air from the east and southeast. The air masses warmed adiabatically as they spilled over the Caucasus ranges. From the eastern Mediterranean to the Black Sea there extended a front aloft. The deep ridge aloft extended from eastern regions of the Middle East and over the Caucasus. Advection of heat aloft occurred over Mesopotamia and Arabia. At Batum temperature rose to 38.3°C on April 16, exceeding the absolute maximum by 7.3°C; at 1300 hours the relative humidity fell to 8%. The daily amplitude of air temperature at Batum amounted to 23.9°C and of relative humidity 55%. *Subject Headings:* **1. Föhn winds 2. Black Sea coast 3. Caucasus.**—*I.L.D.*

10.11–194 551.555.3

†§Picard, Alice, **Connaissance du foehn.** [Knowledge of föhn.] *L'Information Géographique*, Paris, 22(5):209–220, Nov.–Dec. **1958.** 11 figs., 43 refs. **DLC**—Excellent attempt to restate our knowledge of föhn and more especially that of the "Südföhn" of the Swiss, Tirolese and Bavarian Alps. The first part deals with the warming up and parching effects of föhn, its influence on climate which differs from one point to another and also at the same place from one season and from one year to another. The second part is an account of the development of a föhn situation. Diagrams and graphs show the evolution of the anticyclonic and cyclonic stages of föhn and the corresponding isobaric situations. Two isobaric situations over Europe during "Nordföhn" and likewise two situations during "Südföhn" are explained. In the third part, the author examines the different theories relating to föhn: theories supposing the pre-existence of a current in the high atmosphere, theories implying the previous removal of cold air, theories based on thermodynamic principles and on hydrodynamic analogies. Three conditions seem to be indispensable for the development of a föhn current: 1) a sufficiently deep anticyclonic subsidence with divergence above a mountainous obstacle, 2) a cyclonic moving about on one side of this obstacle and acting as a pump, 3) a stable and stratified air mass on the other side of the obstacle. *Subject Headings:* **1. Föhn 2. Synoptic analysis of föhn occurrences 3. Föhn theories.**—*A.V.*

10.11–195 551.555.4

*†Eddy, Richard Leland, **Canyon winds at Hill Air Force Base, Utah.** Utah. Univ. Dept. of Meteorology, Grant S-4, Technical Report, No. 1, June **1957.** 46 p. 15 figs., 6 tables, 18 refs. **DWB** (M(051)U89te)—Factors that influence easterly canyon winds when the velocity remains above 20 kn for several hours have been investigated in order to determine a good forecasting technique for the Mountain States. This involved a collection of data as well as case studies. Since there exists some inconsistency in the pressure gradients of the various wind stations it has been argued that there should be an indexing system developed to account for the overall thermal circulation in those states. *Subject Headings:* **1. Canyon winds 2. Wind forecasting 3. Hill Air Force Base, Utah.**—*N.N.*

10.11–196 551.555.6:551.513.

§Kononova, N. K., **K voprosu o kholodnykh vkhozhdeniiakh v raĭon Issykh-Kul'sko kotloviny zimoĭ.** [Invasions of cold air into the region of the Issyk Kul depression durin winter.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:27–30, **1958.** 2 figs. **DWB, DLC**— The physical geography of the Issyk Kul depression, the local atmospheric circulation a influenced by the orographic effect of the surrounding mountains, and the climate of this regio are outlined. The characteristics of the winter invasion of cold air which can proceed eithe from east (the San-Tash pass) or west (the Boom gorge) are described. Their intensity depend upon the vertical thickness of the oncoming air masses and the temperature contrast betwee the arriving and supplanted air. The cold invasions occur during the presence of a cyclon over the Balkhash district or of an anticyclone centered over the Bet-Pak-Dala district. Tw types of synoptic processes characterizing winter cold air inversions in the lake depression ar analyzed with the aid of synoptic maps. *Subject Headings:* **1. Cold air invasions 2. A mospheric circulation 3. Issyk Kul, Soviet Central Asia.**—*I.L.D.*

WIND EFFECTS

See also: **Shelter belt effects on snow** (Caborn), 10.11–222.

10.11–197 551.556.8 551.464(26

Halim, Joussef, **Observations sur l'hydrologie de la Baie et du Canyon de Villefranche sur-Mer.** [Observations on the hydrology of the Villefranche-sur-Mer Bay and Canyon *Vie et Milieu*, Paris, 9(3):278–292, **1958.** 7 figs., 7 tables, 16 refs.—The wind regime and th effects of the predominating winds are described. The main hydrographic features of the ba and submarine canyon are outlined. NIELSEN'S intermediate layer of salinity and temperatu maximum is here characterized also by a maximum in phosphates. As an effect of the ea winds, this layer shows a tendency to upwell at about 16 mi offshore. Occasional squalls west winds also produce upwellings within the bay, but they are less frequent and of a limite extent. A wedge shaped layer (the first minimum temperature layer) formed the precedin winter, extends off the continental slope at depths of about 200–300 m. Mixed Atlant waters are observed as a thin subsurface layer of salinity minimum. *Subject Heading* **1. Hydrology 2. Wind effects on bays 3. Sea water composition 4. Villefranche-sur-M Bay, France 5. Mediterranean Sea.**—*Author's abstract.*

10.11–198 551.56.8:551.461.2:533.6.0

Schooley, Allen H. (*U. S. N. Res. Lab., Wash., D. C.*), **Probability distributions of wate wave slopes under conditions of short fetch.** *American Geophysical Union, Transaction* 39(3):405–408, June **1958.** 5 figs., table, 5 ref. **DWB, DLC**—Slope probability distributio were measured for a fetch of about 15 in., using a small wind tunnel containing a water boun ary. For this very short fetch, the mean-square slope was found to be higher than previou longer-fetch data for wind velocities greater than about 10 kn. At 18 kn the short fet mean-square slope was 70% higher. Evidence of peakedness of the slope distributions w found in the short-fetch data. The mean value of the distributions was measured to reach maximum in the downwind direction and was about 1.5° in the region of 18 kn. *Subje Headings:* **1. Water surface slope 2. Fetch width 3. Slope probability distribution 4. Wi tunnel experiments.**—*Author's abstract.*

10.11–199 551.556.8:551.52

Berenbeĭm, D. Ia., **Vliianie atmosfernykh protsessov na termicheskiĭ rezhim deiatel'no sloia Chernogo moria.** [The effect of atmospheric processes on the thermal regime of th active layer of the Black Sea.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:45–47, 195 4 figs., 8 refs. **DLC, DWB**—The effect of atmospheric processes, in particular wind condition upon the distribution of water temperature in the upper surface layers of the Black Sea studied with the aid of the calendar of weather types over the Black Sea worked up by D. I STAROV for the period from 1934 to the present. This calendar is comprised of daily synopt charts based upon an analysis of the wind field. The northeastern weather type is the fund

mental cause of cooling of the Black Sea during winter as the increased number of days with northeast weather is associated with a lowered mean monthly water surface temperature. A homothermal layer is formed as a result of winter cooling and the temperature and thickness of this layer are dependent upon the frequency of days with northeast weather. Graphs showing the number of days with northeast weather during December–February and sums of mean monthly temperature for the same months, the homothermal temperature layer at Cape Aira and number of days of northeast weather for December, the minimum temperature of the cold layer in the Crimean, and Batum in August and the number of days with northeast weather for December–March and November–March, etc. are presented. Correlation coefficients between total of northeast weather days and minimum temperature of the cold layer are as high as 0.70 and 0.90. *Subject Headings:* **1. Wind effects on water temperatures 2. Wind field analysis 3. Black Sea.**—*I.L.D.*

10.11–200 551.556.8:551.461.2

Lauwerier, H. A., **The motion of a shallow sea under influence of a non-stationary windfield.** *Amsterdam. Mathematisch Centrum, Afdeeling Toegepaste Wiskunde, Rapport* TW-31, **1955.** 22 p. eqs. Also his: **The motion of a half-plane sea under influence of a non-stationary wind.** *Ibid.*, TW-32, Dec. **1955.** 12 p. 11 figs., eqs. Also his: **Influence of a disturbance upon an infinitely large shallow sea of constant depth.** *Ibid.*, TW-35, July **1956.** 11 p. fig., table, eqs. Also his: **The wind effect in the southern part of the North Sea due to a single storm and the influence of the Channel.** *Ibid.*, TW-36, June **1956.** 16 p. 6 figs., eqs. **DWB** (M055 A528ra)—These studies contain a theoretical treatment of the problem of the rise of sea level under the influence of wind, and also numerical applications to the North Sea. The Laplace transform of sea level elevation is derived from the wind field, considering various general and particular conditions, such as stationary or nonstationary wind field, half-plane or channel-like sea, wedge effects, influence of the earth's rotation, etc. Graphs of the different relationships obtained are included. *Subject Headings:* **1. Wind effects on shallow water 2. Wind effects on sea level 3. North Sea.**—*G.T.*

UPPER AIR WINDS

See also: **Circulation-jet stream relationships** (Pogosian), 10.11–9; **Jet weather** (McTaggart-Cowan), 10.11–70; **Upper air data** (Angell), 10.11–108; **Upper air wind measurement** (Cline), 10.11–110; **Mean vector winds,** 10.11–188; **Wind profile determination** (Chamberlin et al.), 10.11–190.

10.11–201 551.557:551.558

Faust, Heinrich, **Mittlere Höhenwindverhältnisse bis 30 km Höhe über Berlin.** [Mean upper wind conditions up to 30 km over Berlin.] *Naturwissenschaftliche Rundschau,* Stuttgart, 11(7):275, July **1958. DWB, DLC**—The author summarizes R. Holzapfel's paper **Über die Luftbewegung bis 30 km Höhe über Berlin** [Air motions to 30 km height over Berlin.] (*See* 10.9–236, Sept. 1959, *MAB.*) Wind velocity increased from the ground up to the null layer at 18 km altitude. In this layer the vertical movements reverse themselves. As a result of adiabatic up and down motions the null layer separates thermally opposite regions—below the null layer the air of a high is warmer than that of a low; above the null layer it is colder. Horizontal air movements become more equalized the higher they are above the null layer. At 18 km a layer of very weak winds was observed. Above 18 km the mean wind velocity increased again up to 30 km. While a west-east drift prevailed up to a considerable height during winter and the cold parts of the year an east-west drift prevailed in summer, from about mid-May to mid-August. *Subject Headings:* **1. Upper air wind investigations 2. Zero layer 3. Vertical wind velocity gradient 4. Berlin, Germany. I. Holzapfel, R.**—*I.L.D.*

10.11–202 551.557:629.13

*Ryan, P. (*Meteorological Office, Darwin*), **40,000 ft. winds Singapore-Darwin.** *Australian Meteorological Magazine,* Melbourne, No. 20:66–70, March **1958.** fig., table. **DWB**—A summary of the "found" winds on 58 out of 62 "Comet" flights at about 40,000 ft during June 8

to Sept. 23, 1957 between Singapore and Darwin, Australia. Mean winds and mean head or tail winds are worked out for 5° squares, all of which were south of the ICZ (southern winter) during the period. Comparison is made with balloon soundings at Singapore, Sourabya and Darwin, showing similarities and differences in speed and direction. Mean 40,000 ft streamlines and isotachs for the period are shown on a chart of the area and data given in a table. *Subject Headings:* **1. Upper air winds 2. "Comet" wind summaries 3. Darwin-Singapore air route.**—*M.R.*

10.11–203 551.557:551.547.5

Zobel, R. F., **The evaluation of winds at 200 millibars from contour charts.** *Meteorological Magazine*, London, 87(1028):44–49, Feb. **1958.** 3 figs., 4 tables, 6 refs., eqs. **DWB**—Techniques for obtaining gradient winds, the relation of geostrophic and gradient winds to radius of curvature, wind speed, wind direction, etc. (by graphical and other methods) are compared and criticized. It was found that there is an overall increase of accuracy when winds are estimated from 200 mb-contour charts by correcting geostrophic winds to gradient winds by means of a correction for curvature of the contours, especially if the curvature is anticyclonic and the wind speed >60 kn. Hodographs show that corrections are appreciable for all directions except NE through ESE. *Subject Headings:* **1. Gradient wind evaluation 2. 200 mb analysis**—*M.R.*

10.11–204 551.557.2(71

†*Henry, T. J. G., **Maps of upper winds over Canada.** Toronto, Meteorological Branch, Dept. of Transport, **1957.** 61 p. 6 figs., numerous charts, 17 refs. Price: $.75.—History of upper air observations in Canada, early publications on this subject, properties of upper wind distributions (vector and vector standard deviation), construction of normal contour maps, vector wind speed and direction data and notes on mean circulation, use of maps and possible extension of the work are treated in the text. Maps for 4 seasons for 850, 700, 500, 300 and 200 mb levels for Canada are neatly drawn with blue lines over yellow background. The lines for vector mean wind (knots) are superimposed on the normal geopotential contours. Nomograms and sample frequency curves for wind direction and speed, variations of σ in the vertical accompany the text. Differences in values appear at 300 and 200 mb levels when compared with C. E. P. Brooks et al. (**Upper winds over the world,** *see* 4E–139, May 1951 *MAB*). *Subject Headings:* **1. Upper air winds 2. Upper air wind charts 3. Canada.**—*M.R.*

VERTICAL MOTION

See also: **Theory of convective currents** (Haltiner), 10.11–144; **Mountain waves** (Palm), 10.11–176; **Mountain wave theory** (Scorer, Klieforth), 10.11–177; **Vertical wind velocities** (Ely), 10.11–178; **Steady state stratified flow** (Long), 10.11–186; **Vertical wind velocity, Berlin** (Faust), 10.11–201.

10.11–205 551.558

Woodward, Betsy (*Imperial College, London*), **The motion in and around isolated thermals.** *Royal Meteorological Society, Quarterly Journal*, 85(364):144–151, April **1959.** 6 figs., 6 refs., 4 eqs. **DWB, DLC**—Laboratory measurements show that the motion of an isolated 'thermal' is like that of a vortex ring. The center is rising at slightly more than twice the rate of the thermal cap and on the edges the buoyant fluid is descending, relative to a stationary observer. As the thermal rises, mixing with outside air takes place, approximately 60% at the front and 40% at the rear, and the thermal traverses a cone of half angle about 15°. Heavy particles with a terminal velocity of less than 0.4 W_c, where W_c is the rate of rise of the cap, will not escape from the thermal; whilst those with a terminal velocity exceeding somewhat less than 1.6 W_c cannot be retained in it. It is argued that the isolated thermal is the ultimate form of all convective elements in the atmosphere and that this ultimate form is generally reached between 200 and 2000 m from the ground. *Subject Headings:* **1. Thermals 2. Thermal convection.**—*Author's abstract.*

10.11–206 551.501.75:551.557:551.558.2

Corwin, H. G., **Vertical wind shear as measured by use of the geostrophic wind scale.** *Trans World Airlines, Inc., Kansas City, Mo., Meteorological Technical Bulletin*, 59-2, March 27, 1959. 3 p. 7 figs. **DWB**—An explanation is given on the use of the geostrophic wind scale for the measurement of vertical wind shear. This is important in aviation meteorology since by it the determination of wind at levels intermediate between upper air chart levels can be made. From this the existence of clear air turbulence can be evaluated. *Subject Headings:* **1. Vertical wind shear 2. Geostrophic wind scales 3. Clear air turbulence.**—*N.N.*

10.11–207 551.558.21:551.553.12

Döös, Bo R., **Effect of the vertical variation of wind and stability on mountain waves.** Florida. State Univ., Tallahassee. Dept. of Meteorology, Contract Nonr-1600(00), Technical Report, No. 13, Dec. 30, 1958. 26 p. 6 figs., 19 refs., 41 eqs. **DWB** (M(055) F636t)—The motion over an infinitely long mountain ridge has been studied. The scale of the motion is assumed to be so small that the influence of the earth's rotation can be neglected. It is further assumed that the motion is nonviscous, laminar, steady, and isentropic. The resulting wave equation is solved for certain types of realistic wind and temperature distributions. The wave lengths and the amplitudes have been evaluated for seven different cases which have been selected so that the effect of variation on the wind profile and the temperature distribution can be studied separately. *Subject Headings:* **1. Vertical wind variations 2. Mountain waves.** —*Author's abstract.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY AND EVAPORATION

See also: **Evaporation symposia** (IUGG), 10.11–3; **Temp.-humidity over reservoirs** (Konovodov), **10.11–169**; **Bibliography on Evaporation**, p. 1724.

10.11–208 551.571.35:551.579.5

Young, A. M., **Effect of soils on the duration of high humidity [and] Reply by L. P. Smith.** *Meteorological Magazine*, London, 87(1028):49–51, Feb. 1958. 2 figs., table. **DWB**—Young presents a careful analysis of the wind, humidity and other factors which differ between Lindholme and Finningley (Airports) in Yorkshire, Eng., to show that the explanation given by L. P. Smith (*see* 8.2–206, Feb. 1957, *MAB*) that the lee effect of the Pennines on duration of high relative humidities reaches Finningley but not Lindholme only 5 mi NNE is incorrect. Rather it is concluded that the effect of damp soils in the vicinity of Lindholme accounts for the higher number of hours of high relative humidity there. When winds are light the differences do not appear and when winds are strong the high humidities come under conditions differing from Smith's theory. *Subject Headings:* **1. Relative humidity variations 2. Soil moisture effects on relative humidity 3. Yorkshire, Eng.**—*M.R.*

10.11–209 551.501.771:551.571.7:535.835

Neporent, B. S. et al., **Opyt priamogo izmereniia vysotnogo raspredeleniia vlazhnosti atmosfery spektral'nym metodom.** [An experiment in direct measurement of moisture distribution with height by a spectral method.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:552–555, 1957. 6 figs., 12 refs. **DLC**—The authors present the results of the first experiments of the direct measurement of the water vapor content of the atmosphere by a spectral method which is based upon a graduated vacuum monochromator with a differential grating of 300 lines/mm and dimensions of 50×70 mm representing five spectral regions in the infrared channel, namely 1.24, 1.40, 1.50, 1.88 and 2.2μ. The dependence of the function of extinction with height, the dependence of the amount of condensed water in the vertical upon the height of the apparatus and the distribution of concentration of water in the atmosphere are discussed and represented in graphs. *Subject Headings:* **1. Moisture distribution 2. Water vapor spectroscopy.**—*I.L.D.*

CONDENSATION

See also: **Glaze** (Bennett), 10.11–20.

10.11–210 551.574.1:551.576.11

†Chicago, Univ. Dept. of Meteorology, **Summary of studies of cumulus clouds.** Contrac AF 19(604)-1388, Final Report, Dec. 31, **1957.** 21 p. 2 tables, 29 refs. **DWB** (M74.1 C532tew)—In this study of the characteristics of convective clouds and their interaction with their surroundings, an instrumented B-17 airplane was used in flights over southeastern Arizona. The flight operations and the instrumentation, in particular the cloud wate content meters, are described. Cumulus clouds in the semi-arid Southwest grow to a colde temperature before producing rain than they do in the Midwest, but condensation-coalescenc can produce precipitation even in the Southwest. The droplet size distribution in Arizon cumulus congestus are similar to those in congestus clouds over the central United State The liquid water content of tropical and continental cumuli are similar in that the liqui water content changed rapidly over very small distances and the mean liquid water content were small. The observed water contents exceeded those calculated by the simple parce method ascent in almost all clouds with precipitation echoes. Environmental condition such as atmospheric stability, humidity and vertical wind shear influence the ability of cloud to produce rain. It is concluded that dry ice seeding of individual clouds is not the mos feasible way of studying the efficiency of seeding. *Subject Headings:* **1. Cumulus cloud structur 2. Liquid water content of clouds.**—*Author's abstract.*

10.11–211 551.574.1:551.508.765:551.507.35

Durbin, W. G. (*Met. Office*), **Recent aircraft research into cloud physics.** *Weathe* London, 13(5):143–151, May **1958.** 8 figs., table, 9 refs. **DWB**—A description of the re search and results of investigation of cloud physics carried out by the Meteorological Researc Flight at Farnborough, Hampshire (Eng.). The aircraft impactors, including the samplin records used to obtain spectra of precipitation elements; another type of impactor, provide with a perspex slide for trapping cloud droplets and an instrument for determining the con centration of freezing nuclei are described with the aid of photographs. The results of measure ments of particle size and freezing nuclei concentration presented in a table indicate tha "raindrops, cloud droplets and condensation nuclei have typical concentration of about 1 pe 1000 cc, a few hundred per cc and several thousands per cc, respectively. Of these condensatio nuclei, between 1 in 5000 and 1 in 50,000 is a chloride particle." Freezing nuclei were foun in concentrations ranging from 0.01 to 0.1 per 1000 cc at −15°C to 10,000 cc at −30°C an ice crystals with diameter between 100 and 250 microns in concentrations of between 1 an 50 per 1000 cc. Some investigations in large scale features of clouds are mentioned. *Subje Headings:* **1. Cloud physics research 2. Cloud physics instruments 3. Freezing nucle** —*I.L.D.*

10.11–212 551.509.617:551.574.1:551.578

Genève, R., **Le contrôle de la lutte contre la grêle.** [Control of hail protection.] *Puy Dôme, Observatoire, Bulletin,* No. 2:57–62, April/June **1958.** 4 figs., 2 refs. French an English summaries p. 57. **DWB**—The large-scale seeding experiments carried out in the S.W of France have been replaced by a control using current meteorological observations. Th study of hail probability during a thunderstorm, of the hailstone's diameter, and the duratio of the fall does not show a significant effect of these operations. *Subject Headings:* **1. Physi of condensation 2. Hail protection 3. Hail probability during thunderstorms 4. Franc** —*Author's abstract.*

10.11–213 551.574.1:536.421:546.2

Mason, B. J., (*Fellow of the Royal Society, Imperial College, London*), **Supercooling an nucleation of water.** *Advances in Physics,* London, 7(26):221–234, April **1958.** 3 fig 2 tables, 23 refs., 5 eqs. **DWB**—Results of both theoretical and laboratory investigations the supercooling of small water droplets reported in recent literature are reviewed and sor

tabular and graphical data are reproduced. The problems discussed in particular are the effect of droplet size upon the freezing temperature, the role of foreign particles, properties of freezing nuclei, homogeneous nucleation of supercooled water, and the supercooling of pure water below −40°C (for this latter phenomenon evidence has been produced which the author does not consider satisfactory). *Subject Headings:* **1. Supercooled water drops 2. Freezing nuclei.**—*G.T.*

FOG

See also: **Coastal stratus and low ceilings, Perpignan** (Casanobe, Lombardo), 10.11–67; **Fog forecasting, Friendship Airport** (Harrison), 10.11–71.

10.11–214 551.575.1(943)

*Whittingham, H. E. (*Divisional Office, Brisbane*), **An occurrence of land and sea-breeze fog on the central Queensland coast.** *Australian Meteorological Magazine*, Melbourne, No. 18:44–49, Sept. **1957.** 5 tables, ref. **DWB**—Heavy pea-soup fog, rare in this region, hindered land, air and sea traffic and necessitated the use of headlights at noonday at several places on the coast of Queensland. Three airports were closed on that day (Sun., Aug. 4, 1957). According to H. R. Byers, this phenomenon occurs when warm air from land is cooled as it is carried out over the cool ocean water, where advection fog is formed. This in turn is carried back to land by the diurnal sea breeze. Winds must be light (force 2 to 4) or stratus will result. Details of this unusual occurrence with data on visibility, temp., dew point, wind and weather, and the synoptic situation at 3 a.m., 3 p.m. and 9 p.m. on Sat., Aug. 3, and gradient winds on Sunday, Aug. 4 are given. Sea water temps, and air temp. vs. dew point at island stations are also analyzed. In this case the fog formed over land, was not dissipated over the sea on account of slight dew point depressions and was carried ashore by the afternoon sea breeze. *Subject Headings:* **1. Land and sea breeze fog 2. Advection sea fog 3. Queensland Coast, Australia.**—*M.R.*

10.11–215 551.575(71)

*Thomas, M. K., **Monthly fog data.** *Canada. Meteorological Branch, CIR*-2944, CLI-15, July 23, **1957.** 11 p. 2 tables. **DWB**—This paper contains a definition of fog, a discussion of the atmospheric conditions leading to the formation of fog and the measurement of visibility in fog. Tables are presented giving the mean monthly and annual number of days with fog (1941–1950) for all first order stations in Canada and the number of hours by months during which fog was reported at a number of selected stations. *Subject Headings:* **1. Fog data 2. Fog formation 3. Visibility in fog 4. Canada.**—*I.L.D.*

CLOUDS

See also: **Coastal stratus and low ceilings, Perpignan** (Casanobe, Lombardo), 10.11–67; **Convective cloud thermodynamics** (Haltiner), 10.11–144; **Cloudiness effects on radiation** (Otani), 10.11–165; **Cumulus clouds,** 10.11–210; **Elec. of clouds** (Gunn), 10.11–259.

10.11–216 551.576.1:629.135.2:551.551.8

†Clodman, J., **Contrail dissipation and high level turbulent diffusion.** *Canada. Meteorological Branch, CIR*-3088; TEC-277, Aug. 15, **1958.** 23 p. 8 tables, 21 refs., 31 eqs. **DWB, DLC**—A theory of the dissipation of aircraft condensation trails is developed and it is shown that the significant parameters are the temperature, pressure and relative humidity of the ambient air, the mean wind strength, and Sutton's coefficient of diffusion, *C*. The persistence of about 500 contrails is examined in the light of the above theory. Certain parameters are shown to influence *C*, namely height, proximity to tropopause, the type of isobaric wind-shear present, the type and intensity of curvature of the streamlines, and hydrostatic stability. It is also demonstrated that persistent trails can occur in a dry stratosphere. A persistence nomenclature is proposed for general use. *Subject Headings:* **1. Contrail dissipation 2. Turbulent diffusion.**—*Author's abstract.*

10.11–217 551.576.1:551.501.81

Salamonik, St., **La structure des nuages cumulus et cumulonimbus à la lumière des études par radar.** [The structure of cumulus and cumulonimbus clouds in the light of radar research.] *Schweizer Aero-Revue*, Berne, 33(12):659–661, Dec. **1958.** 7 figs. **DLC**—Brief account of observations of Cu and Cb carried out by radar at Legionowo near Warsaw. From the observations of cloud echoes and cloud sizes and vertical development, conclusions may be drawn concerning the type of cloud, construction, thermal equilibrium of the air and the probability of thunderstorms. Some diagrams show the form of the echoes and the frequency of clouds accompanied by thunderstorms or showers, above certain heights. *Subject Headings:* **1. Cloud structure 2. Radar observation of clouds.**—*A. V.*

10.11–218 551.576.11:551.515.8(411)

McEwan, A., **Rapid development of cumulonimbus cloud behind a weak cold front at Renfrew.** *Meteorological Magazine*, London, 87(1035):267–268, Sept. **1958. DWB, DLC**—A weak occlusion moved from the Isle of Man to North Berwick southward at 1500 G.M.T. on April 28, 1957. Behind this occlusion and parallel to it a weak cold front moved from Aldergrove to just north of Renfrew to Lossiemouth. Behind the occlusion the weather was cloudy with a little light rain. Behind the weak cold front that passed through Renfrew at 1630 G.M.T. three cumulus clouds began to develop rapidly. A funnel cloud protruding from the base of the cloud began to form at 1635 G.M.T. immediately above the airfield at Renfrew the funnel revolved in an anticlockwise direction. Precipitation began to fall from the overhang of the cumulus cloud but did not reach the ground. Two neighboring clouds also developed rapidly up to heights of 10,000–12,000 ft. By 1650 G.M.T. the funnel disappeared and precipitation reached the ground from these clouds and spread rapidly. The rain beginning as drizzle ended as hail and heavy rain; a total of 9.6 mm falling in 25 min. A schematic diagram, showing a vertical cross section of the distortion of a cold front over the high ground to the north of Renfrew and the suggested configuration of the frontal surface, is presented and with its aid a possible way for forecasting the true clearance of the front and the isolated thunderstorm is given. *Subject Headings:* **1. Cumulonimbus development 2. Frontal cloud 3. Renfrew, Scotland.**—*I.L.D.*

10.11–219 551.576.11:551.590

Piotrowski, Stefan (*Astronomical Obs., Univ. Warsaw*), **On the brightness of clouds** *Acta Geophysica Polonica*, Warsaw, 4(3):139–144, **1956.** 8 refs., 3 eqs. Polish summary p. 144. **DWB, DLC**—First the author reviews the present state of investigations of light in a foggy medium, and discusses some important problems in regard to clouds for which solutions have only partially been found. The main part of the paper is a discussion of the applicability of a precise asymptotic formula to a dense layer of cloud. Finally, suggestions for a program of observational determination of monochromatic light beams penetrating through clouds are given. *Subject Headings:* **1. Cloud brightness 2. Light transmission through clouds.**—*A. M. P.*

PRECIPITATION

See: **Second crop during dry season** (de Wit), 10.11–74; **Rainfall and the price of cotton** (Misner), 10.11–84; **Hurricane rainfall** (Miller), 10.11–163; **Flood rainfall** (Riehl, Byers), 10.11–229; **Flood rainfall, Indiana** (Schoppenhorst), 10.11–230; **Circulation effects on precip., N. Africa** (Pédelaborde, Delannoy), 10.11–247.

RAIN, SNOW AND HAIL

See also: **Snow damage to steel towers** (Shoda), 10.11–85; **Hail protection** (Genève), 10.11–212; **Elec. of raindrops** (Gunn), 10.11–259.

10.11–220 551.578.

Nakaya, Ukichiro (*Hokkaido Univ., Sapporo, Japan*), **Snow crystals observed at Mauna Loa.** *Journal of Glaciology*, London, 3(25):364–367, March **1959.** 5 figs., 3 refs. **DWB, DLC**—The expedition to Mauna Loa in Hawaii was undertaken in the winter of 1956–57

order to study the nature of snow crystals in the district where the fewest aerosol particles are present. 170 photo-micrographs of snow crystals were taken at the summit—13,450 ft (4000 m). The varieties of snow crystals were abundant and almost all types hitherto known were observed. The characteristic of the snowfall was the abrupt transition of one type to the other. Many single needles were observed, which are very rare in Hokkaido. Two new types were found; one was a needle composed of many hexagonal columns, and the other an elongated column which is the intermediate state of needle and column. Several photographs were obtained which show the mechanism of formation of ice pellets. *Subject Headings:* **1. Snow crystal forms 2. Snow crystal structure 3. Mauna Loa, Hawaii.**—*Author's abstract.*

10.11–221 551.578.42(759)

Ludlum, David M., **Snowfall in Florida.** *Weatherwise*, Boston, 11(2):55 and 67, April **1958.** photo. **DWB, DLC**—Historical records before 1844 and regular meteorological records since indicate that Florida experiences measurable snow (up to 5″ in depth) about once every 50 years and a flurry of snow about every 5 years on the average. Noteworthy events cited are: 1774; Jan. 10, 1800 (5″ at Point Peter near mouth of St. Mary's River); Feb. 15, 1803 (18″ in central Georgia); Jan. 13, 1852 (2″ at Tallahassee); 1886–87 (up to 1″); 1894–95 (3″ at Pensacola); Feb. 1899 (4″ at Lake Butler and 2″ at Jacksonville); Jan. 1935; Feb. 2–3, 1951 and Jan. 8 and Feb. 13, 1958 (3″ in places). The farthest south snow has fallen is the Fort Myers-Lake Okeechobee-Fort Pierce line (27°N). This is one of the few places in the world where snow falls south of 30°N. *Subject Headings:* **1. Snowfall in Florida 2. Record cold waves 3. Florida.**—*M.R.*

10.11–222 551.578.46:551.556.2

Caborn, J. M. (*Univ. College of Wales, Aberystwyth*), **Some observations on snow drifting near barriers.** *Weather*, London, 13(8):264–267, Aug. **1958.** fig. **DWB**—The significant influence of roughness of the ground near snow fences to secure controlled snow drifting is discussed and illustrated here. Measurements of snow drifting were conducted in Canada, March 1957, after a snow fall of some 40 in. since October 1956, near a one mile N-S oriented shelter belt consisting of 2 rows of 4–5 ft high Siberian pea trees 15 ft windward (W) in front of 2 rows of Manitoba maples approximately 20 ft tall. The windward (W) approach to the northern half section of the shelter belt was over a mile of 10 in. wheat stubble, then 10 yds of weeds up to a single-track road, whereas the approach to the southern half section was over fallow ground. Both sections were covered with wheat stubble on the leeward (E) side. Relative wind speed measurements were conducted leeward (E) from Oct. 9 to Nov. 15, 1956 at different distances from 0 ft to 800 ft and showed an average from 54.6% to 100%, respectively. The average wind speed was then 6.3 mph at the control station located 800 leeward (E). Cup-counter anemometers at 30 in. elevation showed no difference in leeward (E) abatement in either section, prior to the snow drift measurements, yet, the windward (W) side of the northern half section showed only 4–5 in. of snow, the road clear, and leeward (E) there was a 2–2½ ft drift gradually tapering off to 4–5 in. The southern half section exhibited a road blocked by a 2–3 ft snow drift extending to 5–8 ft deep on the leeward (E) side. *Subject Headings:* **1. Snow drifts 2. Shelter belt effects on snow 3. Canada.**—*W.N.*

10.11–223 551.578.462:551.524

Dobosi, Margit (Koltai), **A hőréteg és a léghőmérséklet közötti összefüggés vizsgálatának egy módszere.** [A method of investigating the connection between snow cover and atmospheric temperature.] *Időjárás*, Budapest, 61(1):1–8, Jan./Feb. **1957.** 5 figs., 2 tables, 5 refs. **DLC.** Hungarian and English summaries p. 1. German trans. p. 65–71. **DWB**—Data on snow-cover depth and duration, air temperatures, and vapor pressure at Budapest from 1928–1955 are statistically analyzed to determine the effect of snow on air temperature, and the method of analysis is described in detail. Air temperatures were found to average 4.4°C lower over snow in December and more than 5°C lower in January and February, the absolute minimum for January with snow being −21.7°C, as against −11.5°C without snow, while in February the values were −23.4°C and −10.1°C, respectively. The decrease in air temperature over snow is attributable to the occurrence of snowfall in the presence of cold, continental air masses or advection, and to local cooling due to modified radiation-balance

conditions. The mean daily radiation balance without snow on cloudy days amounts to −2.6 gm cal/sq cm, while with snow it is −11.4 gm cal/sq cm, since most of the radiation is reflected at the snow surface. The effect is most pronounced on clear days, when the radiation balance without snow is −87.9 gm cal/sq cm and with snow is −38.1 gm cal/sq cm. Temperatures over snow in radiation weather decrease with increasing snow depths, since a deep snow cover interferes with outgoing heat radiation from the soil. *Subject Headings:* **1. Snow cover effects on air temperature 2. Snow-air temperature relationships 3. Budapest, Hungary.**—*Author's abstract.*

10.11–224 551.578.462:551.311.1

*†Eriksson, B. E. (*Geographical Inst., Univ. of Uppsala*), **Glaciological studies on the Mika Glacier in Sarek 1956/57.** *Geografiska Annaler*, Stockholm, 40(1):67–80, **1958.** 4 figs., 7 tables, 13 refs. **DLC**—Results of snow temperature measurements in a pit (to 230 cm depth) and of snow stake probes along 4 sections of the Mika Glacier are presented to show the temperature and accumulation during the winter 1956/57. Measurements were made on May 16, 1957. The area was known to be free from snow the summer before so probes to the ice gave accurate data on accumulation. Snow temperature of 0°C at 0–70 cm from surface and at ice indicated that no appreciable ablation had yet occurred. Data on temperature, density, thickness and accumulated water in snow and firn are given and discussed. Accumulation measurements in 17 areas from 942 m to 1490 m elevation show increase in accumulation with elevation to 1424 m. Ablation measurements in June and July are also given and the ablation energy in g/cm² also tabulated for 8 stakes and shown graphically and compared with calculated ablation. The latter is also given for Aug. and Sept. 1–15, making a total for season of 17 g/cm² at 1200 m (height of meteorological station). Accumulation was 84 g at 1235 m and 106 g at 1345 m. Thus the deficit is 95–170 g or −75 g/cm² for the middle part of the glacier and more on the tongue. *Subject Headings:* **1. Glacial accretion data 2. Glacial ablation data 3. Mika Glacier, Sarek, Sweden.**—*M.R.*

10.11–225 551.578.462:551.52

Kirigin, Božidar, **Temperaturni odnosi snježog pokrivača.** [Temperature conditions in snow cover.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 6(1/2):47–56, Jan./June **1957.** 6 figs., 4 refs., table. **DWB**—Snow temperature measurements in Croatia were started in 1949/50 and have been made on a regular basis at several stations since 1951/52. Graphs showing snow temperature profiles (and corresponding air temperatures) in Croatia at various times and places are presented and discussed. The figures include profiles obtained at 3-hour intervals combined into one diagram for visual appreciation of diurnal changes in vertical temperature distribution in a snow cover. *Subject Headings:* **1. Snow temperature data 2. Snow-air temperature relationships 3. Croatia, Yugoslavia.**—*G.T.*

HYDROMETEOROLOGY

See also: **Evaporation symposia** (IUGG), 10.11–3; **Flash floods, U.S.S.R.** (Bogoliubova), 10.11–23; **Hydrological computations** (Chebotarev, Klibashev), 10.11–34; **Water table influence on growth of poplars** (Pourtet, Turpin), 10.11–83; **Pressure effects on water level** (Harris), 10.11–175; **Bibliography on Evaporation,** p. 1725.

10.11–226 551.579.4:551.49:551.509.

Nyberg, Alf (*Swedish Met. & Hydrological Inst., Stockholm*), **Some investigations in hydrological forecasting.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser.* Vienna, 9(1):14–27, **1958.** 2 figs., 5 tables, 8 refs., eqs. English, German and French summaries p. 14–15. **DLC**—In the northern parts of Sweden precipitation falls during the winter as snow, which melts only in spring, i.e. in April and May, or in the northern mountainous regions in June or even in July. Under natural conditions the water level and the flow are high during late spring and summer and low in winter. In order to reach a better utilization of the water power, storage reservoirs have been created and thus the flow can be regulated in order to obtain more power during the winter time. To be able to do this in the most profitable way it is necessary to find the relations between the net influx and the relevant

meteorological factors and then to make forecasts concerning the water supply for rather long periods. Some results from such already established forecast relations are discussed. These forecasts are concerned with the total flow of water during the spring time and are based only upon the amount of precipitation during the winter. Some preliminary results are also given from trials, just being started and aiming at forecasts of the variation with time of the flow during the spring. *Subject Headings:* **1. Hydrologic forecasting 2. Sweden.**—*Author's abstract.*

10.11–227 551.579.4

Pardé, M., **La puissance des crues dans l'Afrique noire et dans d'autres régions intertropicales.** [The force of floods in Black Africa and other intertropical regions.] *Académie Royale des Sciences Coloniales, Bulletin des Séances*, N.s., 4(4):1042–1068, **1958.** table, 4 refs. **DWB**—Using data published in the Hydrographical Yearbook of the Belgian Congo and in the Hydrological Yearbook of the French overseas territories, the author shows that the flow of rivers in that region are not exceptional when compared with those of the tropical regions of America and Asia, and even with those of certain temperate regions. The formula $Q = A\sqrt{S}$ is used for the comparisons; Q = flow in m³/s, S = surface of the basin in km² and A = a coefficient which characterizes the maximum of the floods. For the small basins (some km²), A does not exceed 30 in intertropical Africa, while it reaches the value 200 and even 300 for certain rivers of the United States. For the medium size basins (5000 to 25,000 km²), A does not exceed 30 to 35 in intertropical Africa while the Tarn and the Garonne (France) reach 60 to 75. For the large basins, that of the Congo presents a maximum value of 35 while the Amazon can reach 70. For the monsoons of Asia and the Indian Archipelago, the values of A are still higher than in intertropical Africa and America. *Subject Headings:* **1. Floods 2. Intertropical regions.**—*A.V.*

10.11–228 551.579.4:551.311.1

Plashchev, A. V., **Povrezhdenie sooruzheniĭ l'dom v poĭme reki.** [Damage to structures by ice in the flood zone of rivers.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:35–36, **1958. DWB, DLC**—In the rivers of the southern part of the U.S.S.R. high floods may occur during the winter which result in ice damage not only in the principal channel of rivers but also in the flood area. This occurred on the northern Donets River during the winter flood of 1955. As a result of heavy rainfall in November and December the water level rose by 4 m relative to the winter boundaries and the right bank remained under water for about two months. Owing to abrupt temperature fluctuations an ice cover formed over the flood area. During the ice run considerable damage was inflicted upon power line poles and railroad tracks. The poles were bent 5° to 20°. Also the ground under the flood was saturated and softened. *Subject Headings:* **1. Flood damage 2. Ice damage 3. Northern Donets River, U.S.S.R.**—*I.L.D.*

10.11–229 551.579.4:551.577.61(87)

*Riehl, Herbert and Byers, H. R. (*both, Dept. of Met., Chicago Univ.*), **Flood rains in the Bocono Basin, Venezuela.** A report prepared for R. J. Tipton Associated Engineers . . . for the Ministry of Public Works, Venezuela. Jan. **1958.** 57 p. 33 figs., table, 13 refs., 9 eqs.—A streamline and aerological analysis of weather and wind data since 1952 for northern South America and the Caribbean is used to determine the weather conditions responsible for the principal flood stages in the Bocono River of the Venezuelan Andes. Theoretical computations for a number of tropical cyclones agree with rainfall and stream flow data as shown in scatter diagrams and other illustrations. *Subject Headings:* **1. Flood rainfall, Venezuela 2. Tropical meteorology 3. Bocono Basin, Venezuela.**—*M.R.*

10.11–230 551.579.4:551.577.61(772)

Schoppenhorst, Charles E., **Floods of June–July 1957 in Indiana.** *U. S. Geological Survey, Circular* 407, **1958.** 32 p. 14 figs., 3 tables. **DWB** (M79.4 S373fL)—The floods of June–July 1957 exceeded those previously known on some of the tributaries of the Wabash and White Rivers in central Indiana. Six lives were lost, 1,282 dwellings were damaged, and 125 business places were flooded. Heavy rains of June 27 and 28 resulted from remnants of

Hurricane "Audrey" meeting a front that lay across central Indiana. Heaviest rainfall re ported for the storm period at a U. S. Weather Bureau station was 10.15 in. at Rockville Previous maximum stages during the period of record were exceeded at 12 gaging stations The peak stage on Raccoon Creek at Mansfield exceeded the previous maximum known stage which occurred in 1875. One of the notable rates of discharge recorded was 245 cfs per squar mile from a drainage area of 440 sq mi on Raccoon Creek at Coxville. *Subject Headings:* **1. Flood rainfall 2. Flood damage 3. Floods, Indiana (1957) 4. Indiana.**—*Author's abstract*

10.11–231 551.579.4:519.241.

Schwarz, H. E., **Determination of flood frequencies in a major drainage basin.** *Inter national Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept 1957,* [*Proceedings*], Vol. 3, pub. **1958.** p. 174–187. 8 figs., 4 refs., 9 eqs. **DWB** (M(06 I611g)—The purpose of this paper is to show the application of mathematical frequenc analysis methods developed by the U. S. Army Engineers to the study of the flood frequenc problem of a river basin. Since data of sufficient length for reliable frequency estimates ar available for only a few stations, such an analysis is necessary to develop frequency curve for the many points in the basin, where problems exist. The Potomac River above Washing ton, D. C., a basin of 11,560 sq mi of drainage area has been used to illustrate the use of th mathematical frequency analysis methods. All the data on gaging stations in the Potoma River basin were analyzed to develop individual peak frequency curves. The data were the used to correlate with other stations and with drainage area characteristics to develop pea frequency curves having a much greater reliability than those computed from a single reco only. In addition a method is shown here to obtain a reasonable estimate of flood frequenci for ungaged points on the main stream and its tributaries. *Subject Headings:* **1. Flood fr quency curves 2. Frequency analysis 3. Potomac River.**—*Author's abstract.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATE OF PARTICULAR PLACES

See also: **Climate, Fr. Sahara** (Capot-Rey), 10.11–14; **Climatic data processing** (Landsberg), 10.11–16; **Climate, Austria** (Steinhauser), 10.11–22; **Aeronautical climatology, Zagreb** (Makjanic), 10.11–69.

10.11–232 551.582.2/3(569.

*Gilead, M.; Mane, K. U. and Katsnelson, J., **The climate of Israel.** *Israel. Meteor logical Service,* [*Publications*], *Ser. E,* No. 2, **1954.** 30 p. chart, table. In Hebrew. **DW** (M055 185se)—Climatic values of the usual elements are tabulated for stations in Israel f periods of varying length. The data on rainfall (1901–1930) and on frost hazard are al presented in chart form. Characteristics of the climatic elements are discussed in deta *Subject Headings:* **1. Climate of Israel 2. Climatic data 3. Israel.**—*G.T.*

10.11–233 551.582.2(7

Aguirre, Ernesto Dominguez, **Semblanzas climáticas del Puerto de Veracruz.** [Clima similarities of the port of Veracruz.] *Sociedad Mexicana de Geografía y Estadística, Bolet* 74(1/3):239–262, July/Dec. **1952.** 8 figs., map (fold.). **DWB**—A study of all availa climatic data for Veracruz and vicinity is presented in text, tables and charts, with conclusi that "the port of Veracruz is superior and in many cases incomparable to the great numbe tourist centers in the world which have attained a good reputation owing to intense and telligent propaganda." Temperature, precipitation (mean monthly, mean daily and me number of days in each month of year), prevailing monthly and seasonal wind direction a speed, etc. are discussed, given in tables and shown graphically. Mean temperature a precipitation data for a number of stations near Veracruz are also presented in tables and sho on a large colored isothermal and isohyetal map. *Subject Headings:* **1. Climate of Verac 2. Veracruz, Mexico.**—*M.R.*

10.11–234 551.582.2(988)

*†Hare, F. Kenneth, **The climate of the American Northlands.** (In: **Dynamic North.** Wash., D. C. Technical Assistant to Chief of Naval Operations for Polar Projects, **1956.** Vol. 1, Pt. 2. 33 p. 6 figs., 6 tables, 34 refs.) **DWB.** (For abstract on title from another source, *see* 5.6–249, June 1954, *MAB*)—A general discussion of physiographic controls, dynamic climatology, air masses, fronts, cyclones, "dynamic" regionalization, Greenland's peculiarities and physical climatology of the Arctic and sub-Arctic part of North America. Mean January and July sea level pressure and temperature charts, and charts with isochrones of spring thaw and fall freeze are included along with tables of fog, diurnal temperature range, blowing snow factor in visibility on Greenland ice cap, etc. Comparison is made between conditions in North America and Asiatic Arctic. This article has been amplified slightly to include 1951–1956 information and references. *Subject Headings:* **1. Climate of American Arctic 2. Dynamic climatology 3. Canadian Arctic 4. Greenland.**—*M.R.*

10.11–235 551.582.2:551.584.2(494)

Grosrey, Adrien, **Le climat de Genève.** [The climate of Geneva.] *Le Globe*, Geneva, 97:99–114, **1958.** 5 figs., 2 tables, 5 refs.—A statistical study of the principal climatological factors observed at Geneva during the period 1913 to 1956: mean and extreme monthly, seasonal and yearly temperatures; time of first and last frosts; cold and warm periods; temperature jumps; pluviometric regime; important rainfalls; snow; prevailing winds; etc. The study of temperature, its variations, precipitation distribution and atmospheric currents shows that Geneva possesses a climate with characteristics of the Atlantic regime, the Continental regime and the Mediterranean regime. *Subject Headings:* **1. Local climate 2. Climate of Geneva 3. Geneva, Switzerland.**—*A.V.*

10.11–236 551.582.2(798)

*Heller, J. R. (*Weather Bureau, Anchorage, Alaska*), **Climate of the Matanuska Valley with special reference to recent micro-climatic studies of the area.** U. S. Weather Bureau, Nov. **1944.** 5 p. table. Mimeo. **DWB** (M82.1/798 U587cL)—A brief survey of a number of the climatic elements comprising the local climate of the Matanuska Valley, based on data from 5 stations in the area. *Subject Headings:* **1. Climate of Matanuska Valley 2. Matanuska Valley, Alaska.**—*M.R.*

10.11–237 551.582.2(899)

*Uruguay. Servicio Meteorológico. Div. Climatología, **Algunas estadisticas climatológicas del Uruguay.** [Some climatological data of Uruguay.] *Revista Meteorológica*, Montevideo, 14(50/51):14–22, June/Dec. **1956.** 2 figs., 4 tables.—Results of a detailed analysis of monthly climatic values of precipitation (means, frequencies of rainy days, quantities, intensities, etc.) at the Prado Observatory (1901–1954) are tabulated and discussed. Included are also monthly precipitation normals for 20 stations in Uruguay (1914–1953) as well as cloudiness and temperature data for Prado. *Subject Headings:* **1. Climatic data for Uruguay 2. Uruguay.**—*G.T.*

CLIMATIC VARIATIONS

See also: **Pleistocene geology** (Flint), 10.11–12; **Climat. changes, Fr. Sahara** (Capot-Rey), 10.11–14; **Climat. changes, Arctic** (Girs), 10.11–161.

10.11–238 551.583.14:551.557.5(52)

Yamamoto, T. (*Yamaguchi Univ.*), **On the mechanism of the climatic changes in Japan.** *Geophysical Magazine*, Tokyo, 28(4):505–515, Sept. **1958.** 7 figs., table, 7 refs. **DWB, DLC**—In a previous study on the secular change of the climate of Japan published in 1948, the author pointed that the means of around ten-year period for several kinds of climatic factors obtained in Japan have been changing with a general tendency. Since then about ten years have passed, and YAMAMOTO reports that the general climatic tendency above mentioned still remains with the same regularity which was pointed out in his previous papers. In this paper he attempts to throw light on the physical mechanism responsible for the secular trends

of the Japanese climate under the working hypothesis of long period changes of jet streams. *Subject Headings:* **1. Secular climatic variations 2. Jet stream variations 3. Japan.**—*Author's introduction.*

10.11–239 551.583.3:551.311.12

Friedan, Betty, **The coming Ice Age.** *Harper's Magazine*, N. Y., 217(1300):39–45, Sept. **1958. DLC**—The writer summarizes in popular fashion the EWING-DONN theory that the next Ice Age will be brought about by the melting of the Arctic Pack Ice, which strangely would cause a warming of the entire Arctic basin, but heavier snows in the now almost desert sub-Arctic continental areas. Evidence that a marked change took place 11,000 years ago—from Atlantic and Gulf sediments, glacial lake beaches and caves, archeological remains, etc.—is cited to create a theoretical succession of events which occurred at the time now recognized as valid for the last Ice Age. This warming could occur again in the next 100 years, raising sea level and starting the glacial cycle which would build up for several thousands of years. *Subject Headings:* **1. Arctic ice melting 2. Ice Age theories 3. Oceanic sediment evidence of ice age. I. Ewing, Maurice II. Donn, William.**—*M.R.*

10.11–240 551.583.3/.7

Flint, Richard Foster and Gale, A. W. (*Yale Univ.*), **Climate change at Searles Lake, California.** (In: California. Univ. Scripps Institution of Oceanography, **Proceedings [of the] Conference on Recent Research in Climatology, March, 1957.** Issued by Univ. of California. p. 23. **DLC** (QC851.C54), **DWB** (M8 C153co)—An examination of sediments taken from Searles dry lake basin in the Mohave Desert, along with radiocarbon dates, appears to confirm evidence from elsewhere in the western U. S. that the eastern glaciation 20,000 to 25,000 years ago was accompanied by lower temperatures and increased precipitation in the west. Evidence is also found of a similar climatic sequence at an earlier period. *Subject Headings:* **1. Quaternary climates 2. Paleoclimatology 3. Searles Lake, Calif.**—*G.T.*

10.11–241 551.583.3:551.526.6:539.16:546.21

Emiliani, Cesare, **Ancient temperatures.** *Scientific American*, N. Y., 198(2):54–63, Feb. **1958.** photos, figs., graphs. **DLC**—By measuring the ratio of oxygen isotopes in a fossil shell, one can deduce the temperature of the water and hence the climate of the age in which the shell grew. The use of this "thermometer" as a tool in geochronology and climatic change study was introduced in 1946 by HAROLD C. UREY, of the University of Chicago, in a lecture to the faculty and students of the Technische Hochschule of Zurich. In this popular scientific article many details of results obtained in study of paleotemperatures and climatic trends are described and illustrated. Bottom temperatures in the Antarctic waters are an important link. Graphs show isotopically derived temperatures in the various epochs from 92 million years ago to now. *Subject Headings:* **1. Isotopic sea temperature analysis 2. Paleotemperatures 3. Climatic changes.**—*M.R.*

MICROCLIMATOLOGY

See also: **Physical microclimat.** (Brooks), 10.11–5; **Cotton field microclimat.** (Zuev), 10.11–19; **Forest micromet.** (Smith), 10.11–80; **Local climate, Geneva** (Grosrey), 10.11–235.

10.11–242 551.584:551.585.55(477)

†*Dubinskiĭ, G. P., **Stepnoĭ oazis Askaniia-Nova (Opyt predvaritel' noĭ mikroklimaticheskoĭ kharakteristiki).** [Askaniia-Nova steppe oasis: attempt at a preliminary microclimatic characterization.] *Kharkov. Universitet. Uchenye Zapiski*, 56:155–172, **1956.** 2 figs., 1 tables, 16 refs. **DLC** (AS262.K415)—Extensive tables of data used in calculating the heat balance on the steppe, at the Botanical Gardens and meteorological station at Askaniia-Nova, an oasis in the southern Ukraine, at Kakhovka (July 12–27, 1952), and other places are presented and analyzed to show that the diurnal heat balance gives temps. 5°C lower in a forested area than on the open steppe. Data obtained at 5, 7, 9, 11, 13, 15, 17 and 19 h were: air temp. at 20, 50, 150, 200 and 400 cm, lapse rate from 20–150 cm, relative and absolute humidity

and saturation deficit at above heights above ground, and cloudiness. Microclimatic data were also obtained for an irrigated and nonirrigated alfalfa field (same as above, plus wind direction and speed). Data on heat balance are compared with data for Proseka Botanical Garden and for Beriolov on the middle Dnieper. *Subject Headings:* **1. Steppe microclimates 2. Heat balance over soil 3. Oasis microclimates 4. Forest influence on heat balance 5. Askaniia-Nova, Ukrainian S.S.R.**—*M.R.*

10.11–243 551.584.2:551.509.31

Tepper, Morris (*U. S. W. B.*), **Mesometeorology: the link between macroscale atmospheric motions and local weather.** *American Meteorological Society, Bulletin*, 40(2):56–72, Feb. 1959. 20 figs., 14 refs. **DWB, DLC**—Mesometeorology is the study of atmospheric motions of characteristic dimensions too small to make them readily identifiable on the macroscale synoptic maps in use today. Results of mesoanalysis reveal systems which have definite order, pattern and chronological continuity, and with which most pertinent local weather seems to be associated. The role of mesometeorology in local weather forecasting is analyzed. Nine senior meteorologists with considerable experience and stature in the field of forecasting participated in a forecasting experiment wherein three were given mesometeorological analyses and six were given the regular analyses available at a forecasting center. The results showed that the former group was able to identify and forecast the short-range significant variations in wind, temperature, and precipitation in time and place while the others in general could not. *Subject Headings:* **1. Mesometeorology 2. Mesoanalysis—local weather relationships 3. Short range forecasting improvement.**—*Author's abstract.*

CLIMATIC CLASSIFICATION

See also: **Atmos. elec. obs. in Swiss Alps** (Israël), 10.11–24; **Steppe microclimate** (Dubinskiĭ), 10.11–242.

10.11–244 551.585.5(85)

†Reparaz, G. de, **La zone aride du Pérou.** [The arid zone of Peru.] *Geografiska Annaler*, Stockholm, 40(1):1–62, **1958.** 31 figs., bibliog. p. 60–62. **DLC**—A descriptive and graphic study of the arid coastal strip of Peru, treating the general climatic controls, insolation, evaporation and precip., irrigation requirements in various valleys, topoclimates; civilization; flora, fauna and their relation to climate; the Guano Isles; effects of relief and altitude on vegetation, hydrology and erosion; fogs and their effect on vegetation, etc. A complex graph shows contrasts of climates of various parts of the arid zone with respect to evaporation, cloudiness, and sunshine in the N. Central and S. sectors of the coastal strip based on 1951 data from 9 stations. The central sector is humid with low evaporation, the north and south sectors dry and sunny with high evaporation. *Subject Headings:* **1. Arid zone climatology 2. Climate of arid zone of Peru 3. Peruvian Coast.**—*M.R.*

10.11–245 551.585.53:551.555.3(477)

†Buchinskiĭ, I. E., **Raĭonirovanie Ukrainy po stepeni podverzhennosti ee sukhoveiam.** [Division of the Ukraine into districts according to its liability to drought.] *Kiev, Ukraine. Ukrainskiĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 8:31–45, **1957.** 8 figs., 3 tables, 19 refs. **DLC** (Slavic)—The division of the Ukraine according to drought liability is made on the basis of an analysis of meteorological observation data of the mean seasonal number of days with dry winds (criterion: relative humidity 30%, air temperature 25°C, wind speed 5 m/sec) at 85 stations during a 20-year period (1936–1955). It is shown that 6 regions (with an approximately equal seasonal frequency of days with dry winds ranging from 20–23, 15–19, 10–14, 5–9, 1–4 and less than one day) exist in the Ukraine (the oblasts in each of the 6 categories are listed in a table). Maps showing the mean distribution of days with dry winds for individual months, April–July and April–October are included. It has been found that the number of days with dry winds during 1936–1955 has increased by 20–30%, as compared with observation data for a much longer period. *Subject Headings:* **1. Drought areas 2. Dry winds 3. Ukrainian S.S.R.**—*A.M.P.*

10.11–246 551.453:631.44:551.585.5

Naegelé, Antoine, **La végétation de la zone aride. Les parcelles protégées d'Atar** [Vegetation of the arid zone. The protected parcels of Atar.] *La Nature*, Paris, N°. 3286 72–76, Feb. **1959.** 15 figs. **DLC**—Brief description of the evolution of the Sahara, the dis appearance of plant cover and the poor flora due to the combined action of climatic and huma factors. An account is given of the experimental results obtained on parcels of terrain in th Sahara (Atar region), which are protected in order to preserve them from human action. Afte three years of experiment, it can be stated that as soon as plant cover is protected from ma and animals, a few months are sufficient for a reasonable increase of its productivity. *Subje Headings:* **1. Arid zones 2. Desert climates 3. Vegetation protection 4. Atar Region, Sahara** —*A.V.*

BIOCLIMATOLOGY

See: **Second crop during dry season** (deWit), 10.11–74; **Climatic limits of subterraneum clovers** (Davidson), 10.11–75; **Tomato cultivation** (Cohen), 10.11–76; **Tobacco protection from aphids** (Michel), 10.11–77; **Climat. effects on maize blight** (Middendorf), 10.11–79; **Climat. effects on forest production** (Pardé), 10.11–81.

ENVIRONMENTAL INFLUENCES

See: **Urban influences on temp. increases** (Fukui), 10.11–167.

SYNOPTIC CLIMATOLOGY

10.11–247 551.589.1:551.577.11(6

§Pédelaborde, P. and Delannoy, H., **Recherches sur les types de temps et le mécanism des pluies en Algérie.** [Research on weather types and rain mechanism in Algeria.] *Annal de Géographie*, Paris, 67(361):216–244, May–June **1958.** 17 figs., 7 tables, 23 refs. D namical study of the climate of North Africa, principally based on the analysis of variou weather types described in atmospheric models corresponding to structures of the flo aloft at the 500 mb level with consideration of the Atlantic trade-wind front and the Saharia front, and examination of the general conditions of the circulation at 500 mb. The variou types of circulation at 500 mb considered are: the cyclonic types from N, the cyclonic typ from W and SW, the cyclonic types from S, the anticyclonic types and the summer thunder types. In the analysis of the influence of the circulation types on the regime of rains, th authors determine the frequencies of the circulation types and present a quantitative study the regime of rains with regard to the circulation types. This study gives an inkling of th essential mechanisms of the rainfall regime: a) rain always results from cold air outbrea originating from the temperate zone; b) usually general weakening of disturbances towards th S, in all seasons, on account of the progressive desiccation of air masses; c) irregularity precipitation in all seasons and in all regions; irregularity which is greater in the interior of th continent. *Subject Headings:* **1. Synoptic climatology 2. 500 mb circulation types 3. Rainfa regime, N. Africa 4. North Africa.**—*A.V.*

10.11–248 551.589.5:656.71(78

Farthing, E. D., **Analysis of ceilings and visibilities vs. wind direction and speed Stapleton Airfield, Denver, Colorado.** Kansas City, Missouri, Trans World Airlines, In Meteorology Section, Jan. **1956.** 16 p. 11 figs., 10 tables. **DWB** (M06.3/788 T772a) Combined wind direction and speed, ceiling and visibility data for Denver Airport are present in tables and complex wind roses, showing that good flying weather occurs 98% of the tim at Denver, and that the bad weather is most apt to occur with strong NNW–NNE winds a least apt to occur with the prevailing S–SW winds. Analyses are based on hourly records f January 1934–December 1941 and January 1948–December 1950 (95,000 observation Data are interpreted in terms of runway usage in good and bad weather (of different degree *Subject Headings:* **1. Ceiling-visibility-wind data 2. Airport landing conditions 3. Aer nautical meteorology 4. Denver, Colorado.**—*M.R.*

10.11–249 551.589.5

Nagao, T. (*Met. Training School, Kashiwa, Japan*), **The statistical verification of the characteristics of singularity.** *Geophysical Magazine*, Tokyo, 28(4):533–538, Sept. **1958.** fig., table, 3 refs., eqs. **DWB, DLC**—In the first paragraph the singularity in the minimum range of the frequency distribution of daily mean temperature at Numazu and other stations is examined statistically (here the singularity is defined as the day on which over most of Japan either maximum or minimum of normal daily temperature is observed). The minimum range in singularities was ascertained within 5% level along the southern coast of Japan. At other stations such as Fushiki, Hiroshima, Okayama, etc., the minimum ranges in the singularities are not observed, but rather the maximum ranges are found with about 10% error. In the second paragraph the relations between the range of the frequency distribution of daily precipitation amount and the singularity are discussed. The error estimating the parameter of Gamma distribution fitted to the frequency distribution of daily precipitation amount was 1 to 5%. In the third paragraph the number of rainy days in singularity is statistically investigated. The maximum number of rainy days along the southern coast of Japan and the minimum number over other regions were examined with 5–10% error. *Subject Headings:* **1. Temperature singularities 2. Temperature frequency distribution 3. Precipitation singularities 4. Japan.**—*Author's abstract.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Sunspot-cotton crop relationships** (Misner), 10.11–84.

10.11–250 523.75:551.590.21

Dauvillier, Alexandre, **Sur la structure et le mécanisme des taches solaires.** [Structure and mechanism of sunspots.] *Académie des Sciences, Paris, Comptes Rendus*, 248(8):1084–1086, Feb. 23, **1959.** 4 refs. **DWB, DLC**—The phenomena constituting solar activity have an electrodynamical rather than a thermodynamical nature. The author shows how the magnetic field is produced by the mechanical torsion of an arc-like bundle of filaments forming the penumbra. The magnetizing circuit is constituted by the filaments forming the granulation. These filaments are distorted in spiral bows and are often visible in the penumbra of large spots. *Subject Headings:* **1. Solar activity 2. Magnetic field of sunspots.**—*A. V.*

10.11–251 551.590.21:551.509

Halacy, D. S., Jr., **The sun: author of weather.** *Flying*, N. Y., 60(6):40, 84–85, June **1957.** photos. **DWB**—Interpretation of the solar emission lines as related to weather and weather prediction is discussed. The present knowledge, current work and use of the HAO-TWA index as an aid to weather forecasting are summed up. *Subject Heading:* **1. Solar-weather relationships.**—*W. N.*

10.11–252 523.75:551.590.21:551.510.535

Koeckelenbergh, André, **L'éruption solaire remarquable du 23 mars 1958 à 09 h 49 m TU.** [The remarkable solar eruption of March 23, 1958 at 09 h 49 m UT.] *Ciel et Terre*, Brussels, 74(11/12):450–453, Nov./Dec. **1958.** 2 plates, table, 7 refs. **DLC**—Description of the evolution of a solar eruption with an importance of 3^+, which was observed at the Royal Belgian Observatory. An important radioelectric jump was connected with the eruption and an ionospheric perturbation (S-SWP) began at 9 h 53 m UT. But this phenomenon seemed not to be related to a radio- or magnetic perturbation. *Subject Headings:* **1. Solar eruptions 2. Ionospheric disturbances 3. Uccle, Belgium.**—*A. V.*

10.11–253 551.590.21

Takahashi, K. (*Met. Res. Inst., Tokyo*), **The effect of the change of solar activity to meteorological phenomena.** *Meteorological Society of Japan, Tokyo, Journal*, 36(3):97–107, June **1958.** 5 figs., 9 tables, 16 refs., 6 eqs. **DWB, DLC**—Tidal oscillations on the sun due to planets were

calculated, and the following periods were obtained: 25 days, 1.475, 2.375, 2.890, 3.893, 6.552, 9.592, months. Such periodicities were detected in the change of solar activity as well as in some meteorological elements. It must be noticed, however, that the phase angles of the periodicities change regularly due to the 11-year cycle of the sunspot number. Such periodic changes in the meteorological elements were correlated with those in the solar activity and the effects of the change of solar activity to meteorological phenomena were confirmed though the physical process of the effects was not clear. Of course, the amplitudes of such oscillations are very small, being estimated to be of the order of 10^{-4} times the absolute values. Therefore, they are insignificant in daily change of meteorological phenomena but can not be neglected for changes of long periods. Such oscillation on the earth is modified by the general circulation of the atmosphere. The periodicities produced by the coupling between the solar effects and the annual change of the general circulation were calculated for a simple model. Some of the periodicities obtained by such calculations were detected in certain meteorological elements. *Subject Headings:* **1. Solar-atmospheric relationships 2. Solar activity 3. Periodicities.**—*Author's abstract.*

VISIBILITY

See: **Atmos. transparency and visibility** (Gavrilov), 10.11–10; **Cloud brightness** (Piotrowski), 10.11–219.

OPTICAL PHENOMENA

See also: **Optical phenomena** (Kalitin), 10.11–29.

10.11–254 551.593:551.521.326

Barbier, D., **La luminescence nocturne atmosphérique de la raie rouge 6300 Å de l'oxygène.** [The atmospheric nocturnal luminescence of the 6300 Å red ray of oxygen.] *Académie des Sciences, Paris, Comptes Rendus*, 246(19):2780–2781, May 12, **1958. DLC**—Discussion of a great number of observations. Quite a number of distinct causes co-operate in the emission of the 6300 ray. *Subject Headings:* **1. Nocturnal luminescence 2. 6300 Å red oxygen line.**—*A.V.*

10.11–255 551.593.1:551.510.62:551.510.52

Berg, Eduard (*Lwiro, Belg. Congo*), **Phasenverhältnisse im Beugungsschatten in geschichteter Troposphäre.** [Phase relationships in the diffraction shadow of a stratified troposphere.] *Archiv der Elektrischen Übertragung*, Stuttgart, 11(9):366–378, Sept. **1957.** 10 figs., 14 refs., eqs. **DLC.** Transl. into English by A. P. Barsis issued as *U. S. National Bureau of Standards, NBS Translation*, No. 5567, July **1958.** 37 p. 10 figs., 14 refs., eqs. **DWB** (M10.52 B493ph)—The solution of the wave equation for a troposphere with over-critical refraction is given for a magnetic dipole with the aid of WHITTACKER functions in a form from which the solution for a homogeneous or nearly homogeneous atmosphere is found as a special case by equating certain constants to zero. The obtained series expansion of GREEN's function is converted with the aid of WATSON's transformation. For the special case of infinite ground conductivity it is shown that for tropospheric ducts it is requisite to have at least one real zero of the denominator of the reflection coefficient supplying the residues in WATSON's transformation. An approximation shows the dependence of the cutoff wave length of the index of refraction and the height of the tropospheric duct. Besides, the phase surfaces and their displacement at the ground are compared with conditions in a homogeneous atmosphere. *Subject Headings:* **1. Troposphere 2. Refractive index.**—*Author's abstract.*

10.11–256 551.593.5

Blottiau, F., **Remarques à propos de la relation entre les fonctions de distribution et la fonction d'efficacité lumineuse.** [Remarks on the relationship between the distribution functions and the luminous efficiency function.] *Revue d'Optique*, Paris, 36(5):235–240, May **1957.** 2 figs., 6 refs., 2 eqs. **DLC**—Recent trials having suggested that the luminous efficiency function may not be a linear combination of the distribution functions, the author discusses the experimental conditions in which these functions are determined. The eye of the observer

should be maintained in the same state of adaptation throughout the course of the measurements, a change of adaptation, such as those entailed by variations of color or luminance in the field of vision, implies that the spectral sensivity characteristics of the visual receptor are modified. It seems possible to imagine a method which would permit the simultaneous determination of the three distribution functions and the luminous efficiency function while maintaining the state of adaptation of the eye almost always unchanged. The measurements would be taken against a field of fixed color and luminance. Only two heterochromatic measurements would be necessary, but they could probably be chosen so that the corresponding changes of adaptation would have a negligible effect on the functions to be determined. *Subject Headings:* **1. Luminance variation 2. Luminous efficiency function.**—*Author's abstract.*

ELECTRICAL PHENOMENA

See also: **Atmos. elec. obs. in Swiss Alps** (Israël), 10.11–24; **Ionospheric absorption of short waves** (Taubenheim), 10.11–136; **Ionospheric electron density distribution** (Thomas, Robbins), 10.11–138.

10.11–257 551.594:551.506.22

†Israël, H., **Recherches récentes en électricité atmosphérique. Mesures pendant l'Année Géophysique Internationale.** [Recent research on atmospheric electricity. Measurements during IGY.] *La Météorologie*, Paris, Ser. 4, No. 51:161–190, July/Sept. **1958.** 22 figs., 4 tables, numerous refs. French, German, English and Spanish summaries p. 161. **DWB**—Atmospheric electricity phenomena depend on world storm activity and meteorological evolution in the neighborhood of the station. To separate these two factors, it is necessary to undertake: 1) a precise analysis of global reports and 2) an exhaustive study of the meteorological and electrical influences. The first step should be an analysis of sferics in connection with studies of atmospheric electricity (shown by examples). The second step requires an analysis of the influences of atmospheric electricity on the exchange of atmospheric mass. As an example, the author reviews the effect of sunrise, the luminosity effect, the longitude effect and the agitation due to atmospheric electricity. Relations to IGY program are shown. *Subject Headings:* **1. Atmospheric electricity 2. IGY atmospheric electricity program.**—*Author's abstract.*

10.11–258 551.594.12:551.576

Brasefield, Charles J. (*Southern Illinois Univ., Ill.*), **Some observations of low-level ion clouds.** *Journal of Geophysical Research*, Wash., D. C., 64(2):141–148, Feb. **1959.** 11 figs., 3 tables, 8 refs. **DLC**—Simultaneous measurements have been made of the atmospheric potential at 33 m, 21 m, and 8 m above the ground level, using three radioactive probes. The current from each probe to ground passed through a number of 100,000 megohm resistors and the i-r drop across a terminal resistor of 400 megohms was measured. These measurements indicate that clouds of ions whose net charge was sometimes positive and sometimes negative frequently passed overhead at altitudes of ten meters and less. The origin of the ion cloud is uncertain, but it appears that some, if not all, were produced by motor vehicles, particularly diesel-powered vehicles. *Subject Headings:* **1. Low-level ion clouds 2. Ion production by motor vehicles.**—*Author's abstract.*

10.11–259 551.594.12:551.576 551.594.12:551.578.11

Gunn, Ross (*Office of Physical Research, U. S. W. B.*), **The electrification of cloud and raindrops.** (In: American Academy of Arts and Sciences, **Atmospheric explorations.** Cambridge, M.I.T., **1958.** p. 3–24; table, 11 figs., 15 refs., 7 eqs.) **DLC** (QC961.A4)—A review of experimental and analytical results of two years of research in cloud and raindrop electrification by the Office of Physical Research of the U. S. W. B. in Washington, D. C. Electricity of clear air, of clouds, the mechanics of droplet charging by diffusion of atmospheric ions, systematic charging, random charging and aggregation of charge of droplets on a probability basis and electricity of rain are treated. The statistical distribution of charges closely approximates observed values at cloud levels and also observed values at lower levels if corrected for electrical discharge and can be extended to volcanic lightning or to electrical storms on

planets. A series of nearly parallel curves shows equilibrium free charge on raindrops of variou sizes. Theory and experimental data from the author's and other observers works are pre sented and discussed (both laboratory and field measurements). *Subject Headings:* **1. Elec trification of clouds 2. Electrification of raindrops.**—*M.R.*

10.11–260 551.594.2

Kuettner, Joachim P. (*Geophysical Res. Directorate, Air Force Cambridge, Res. Cente Mass.*), **The formation of electric charges in thunderstorms.** (In: American Academy of Art and Sciences, **Atmospheric explorations.** Cambridge, M. I. T., **1958.** p. 25–45. 9 figs 16 refs.) **DLC**—FRANKLIN's writings on his experiments in measuring charges of thunde storms, his introduction of the terms "positively and negatively," "charge" and "discharge in connection with the discovery that the thundercloud is usually negatively charged and tha in snowstorms the charges alternate, and C. and R. WILSON's bipolar model of cloud charges ar cited and discussed critically. The segregation process is further discussed in the light of mo recent data. A quantitative derivation is given in graphical form and discussed and variab meteorological factors (such as up and down drafts in upper and lower or center and sid portions), the solid—liquid phase separation, fluctuations in precipitation, intensity, co ductivity changes before and after a discharge, the "masking" process, discharge and recover time, post-discharges, extremely long discharges (100 mi) and, finally, radar photography lightning paths are discussed and illustrated by quantitative figures and records. The auth maintains that the precipitation near the cloud base is positively and not negatively charge as in Wilson's model. *Subject Headings:* **1. Thunderstorm electricity 2. Franklin's lightnin theories 3. Lightning theories.**—*M.R.*

10.11–261 551.594.2

Loeb, Leonard B. (*Dept. Physics, Univ. of Calif., Berkeley*), **The positive streamer spa in air in relation to the lightning stroke.** (In: American Academy of Arts and Science **Atmospheric explorations.** Cambridge, M.I.T., **1958.** p. 46–75. 17 figs., 13 refs.) **DL** (QC961.A4)—A number of photographs or sequences of photographs of laboratory sparks oscillograms of lightning show the processes by which cloud to ground lightning occurs. T mechanisms of the streamer type of spark starting with a single photoelectron liberated fro a cathode, and the following events: an avalanche of + ions as the path broadens while crossi the gap, the photons creating electrons in the gas which themselves start avalanches in t opposite direction, then a stepped leader, a reverse positive (streamer or streamers), the proce of lateral spread of discharge from drop to drop upwards thus draining a wide area of thund cloud into a small channel, the nature of the return stroke and further laboratory experimen with N_2, O_2, H_2, A and other gases are described. The quantitative aspects are thoroughl covered. *Subject Headings:* **1. Cloud to ground lightning 2. Lightning formation.**—*M.R.*

10.11–262 551.594.2

Malan, D. J., **Lightning.** *Endeavour*, London, 18(70):61–69, April **1959.** 6 figs. (in photos), 13 refs. **DWB, DLC**—Lightning has been studied systematically since BENJAM FRANKLIN proved that lightning was an electric spark. High-speed cameras and cathc ray oscillographs have recently made it possible to understand the processes involved. So of the results are discussed in this review of the most important aspects of thunderstor electricity. *Subject Heading:* **1. Lightning research.**—*N.N.*

10.11–263 551.594.221:550.385(4

Norinder, Harald (*Inst. f. Högspanningforskning, Uppsala*), **Results obtained recen regarding the mechanism of lightning discharge.** Photostat of typescript of p. 739–(7 (source not identified). 25 figs., 6 refs. **DWB** (M94.221 N841re)—An analysis of both pre-discharge mechanism and the main and partial discharges of the lightning strokes v made at the Institute of High Tension Research, University of Uppsala, during the 3 thund storm seasons of 1954–1957. To determine this mechanism from the preliminary and s sequent tests it was necessary to measure the magnetic field variations from lightning charges and related phenomena by means of frame aerials effectively shielded from the influe of electric field components. Distances to the lightning strokes were determined by dir

observation. Oscillographic measurements of the components of the magnetic field variations, together with simultaneous photographs, were of greatest importance in this analysis. *Subject Headings:* **1. Lightning discharge data 2. Magnetic field variation during lightning 3. Lightning field investigations 4. Uppsala, Sweden.**—*N.N.*

10.11–264 551.594.223:551.510.7:551.311.5

La foudre est-elle le siège de réactions thermonucléaires? [Is a lightning stroke the seat of thermonuclear reaction?] *La Nature*, Paris, N°. 3277:169, May **1958. DLC**—According to this note, the starting conditions for thermonuclear reactions are connected with the strong electric discharges which constitute lightning, and it is suggested that ball lightning or "lightning remains" comprise radiocarbon 14. One should be able to detect in fulgurites a β^- radioactivity (that of radiocarbon 14) which would indicate that the radiocarbon 14 found on earth has a double origin: in cosmic rays and in lightning. *Subject Headings:* **1. Lightning 2. Thermonuclear reaction 3. Fulgurites.**—*A.V.*

AURORAS

10.11–265 551.594.5(213)

Chapman, Sydney, **Auroral observation in India and Pakistan.** *National Institute of Sciences of India, Calcutta, Bulletin*, No. 9:180–192, Nov. 2, **1957.** fig., 10 refs. Abstracted from reprint. **DWB** (523.74 C719rg)—Printed records remain of observations from at least eight places, in what is now India and Pakistan, of the great aurora of 4 Feb., 1872; their geographic latitudes range from 34° to 19°N (geomagnetic, 24° to 10°N). Hence this remarkable aurora may be called tropical as well as polar. These records are reproduced and discussed, and a plea is renewed for a search for further records of observations of this aurora (and possibly also others) from the Indian subcontinent. More important still, attention is drawn to the need for observation of future great auroras observable therefrom, and from elsewhere in low latitudes, and especially from high altitude observatories. The types of desirable observations and equipment are outlined. The possibilities of successful observation (on the rare occasions when Nature provides the event) may be increased by keeping a special watch at times when there is an enhanced probability of their occurrence. Such times may be recognized with the aid of magnetic, radio and solar observations made on the spot, or they may be called attention to by an international center, as is planned during the International Geophysical Year 1957–58. *Subject Headings:* **1. Auroral observations in India 2. Tropical incidence of aurora 3. India.**—*Author's abstract.*

10.11–266 551.594.5:551.506.22

Clark, K. C. and Romick, G. J., **An optics field site for auroral studies.** Alaska. Univ. Geophysical Institute, NSF Grant Y/1.14/177), Scientific Report No. 1 (on IGY Project No. 1.14), July **1958.** 21 p. 11 figs. **DWB** (M051 A323sc)—To serve as a guide for future users and for those who plan similar constructions, this report describes the conversion of a prefabricated walk-in refrigerator to an arctic field laboratory for optical auroral studies at the Geophysical Institute. This new facility incorporates certain specialized design features for these researches and has proven very satisfactory in its first winter season of operation. The installation and use of its present major instruments are described. This equipment includes a Hunten scanning spectrometer in a sky-scanning mount; an IGY patrol spectrograph, the College meridian mirror spectrograph, the zenith Hust prism spectrograph, and a Roach scanning photometer. Details of construction, layout, electrical circuits, and other facilities are given. *Subject Headings:* **1. IGY aurora program 2. Auroral observatories.**—*Authors' abstract.*

10.11–267 551.594.5:551.508.9:778.3

Elvey, C. T. (*Geophysical Inst., Univ. of Alaska*); Stoffregen, W. (*Uppsala Ionospheric Observ.*); Belon, A.; Chapman, S. and Herlofson, N., **Auroral photography by all-sky camera.** *International Geophysical Year, 1957/1958, Annals*, Vol. 5, (IGY Instruction Manual), Pt. 2, Aurora and Airglow, pub. London, Pergamon Press, **1957.** p. 121–151. 33 figs., (incl. photos). **DWB** (M06.22 I61ann)—This paper describes the nature and operation of all-sky

cameras, and the subsequent treatment and use of the photographs they provide. The coverage is as follows: (1) general outline of the camera; (2) Stoffregen all-sky camera equipment (AK); (3) installation and adjustment of the Stoffregen camera; (4) operation of the Stoffregen camera; (5) films, their exposure, development and treatment; (6) Alaskan all-sky camera; (7) installation of the Alaskan all-sky camera; (8) tabular plots of all-sky camera, operation and results; (9) synoptic 1/4 hourly maps, grid-matching method and the Ascagraph; (10) the Ascagraph, or plotter for all-sky camera photographs. *Subject Headings:* **1. Auroral photography 2. All-sky auroral cameras.**—*N.N.*

10.11–268 551.594.5(99)

Eschenbrenner, S., **Observations aurorales à Port-aux-Français—Kerguelen (11 août 1957–1er avril 1958).** [Auroral observations at Port-aux-Français—Kerguelen (Aug. 11, 1957–April 1, 1958.] *France. Ministère de la France d'Outre-Mer, Terres Australes et Antarctiques Françaises*, Paris, No. 4/5:39–40, July/Oct. **1958. DLC**—For the observation of auroras, the station of Port-aux-Français uses a "wide field Stoffregen's camera" and a fixed aurora detector. The author gives the principles of functioning of both these instruments. The first analyses of the recordings indicate the relative scarceness of auroral forms called "Homogeneous Arc," the rather flat shape of the draperies, the numerous but weak auroral G (glow) and S (Patchy Aurora) forms during the months January and February 1958, the concordance of the phases of the aurora which occurred on November 26, 1957 and the magnetic storm of the same date. *Subject Headings:* **1. Auroral observations 2. Auroral instruments 3. Port-aux-Français, Kerguelen.**—*A.V.*

PART II. ANNOTATED BIBLIOGRAPHY ON EVAPORATION

Compiled by: Geza Thuronyi

INTRODUCTION

This is the fourth and last in a series of bibliographies on evaporation. The first of this series n the August 1959 issue of *Meteorological Abstracts and Bibliography*) dealt with **instruments and chniques** for evaporation measurement; the second and third (Sept. and Oct. 1959, *MAB*) with gional and local evaporation from surfaces involving plant cover (**evapotranspiration**). The esent bibliography covers **evaporation from water, snow, bare soil and other surfaces not involving ant cover,** and includes papers presenting theoretical approaches to the evaporation phenomenon. he emphasis was placed on works containing quantitative appraisals of evaporation as influenced y various general, regional or local factors. Only incidental attention was given to such subjects theoretical aspects of evaporation as a factor in the thermodynamics of the atmosphere, evaporaon of rain and cloud drops, snow ablation (a more detailed coverage of this field will be found in the ibliographies on the **Micrometeorology of Snow Cover** in Vol. 7, Nos. 7 and 8, July, Aug. 1956, *IAB*, and in the **SIPRE bibliography**), evaporation control techniques, etc. Basic evaporation ata, such as found in regular climatological data publications, have, as a rule, not been considered.

The period covered is essentially 1950 to date and only a very few earlier items have been included. Those wishing to study the earlier literature may consult the **Selective Annotated Bibliography on Evaporation** by H. P. Kramer, *Meteorological Abstracts and Bibliography*, 1(11):733–762, ov. **1950** (210 items).

The **Outline of Contents** given below (**Subject** and **Geographic** outlines), is a combination of the utlines for each of the four bibliographies in this series. Item numbers for the present (fourth) ibliography are printed in bold face, while those referring to the three earlier ones are in parentheses.

The vast quantity of material available on evaporation is by no means exhaustively covered in ese bibliographies; yet it is hoped that the present effort will be found to be a useful contribution.

This bibliography was prepared for and with support from the U. S. Army Electronic Proving round, Fort Huachuca, Arizona.

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10K–1 551.506.3(78):551.573:551.508.72

*Long, Arthur R. (*comp.*), **Evaporation; New Mexico and contiguous areas.** Albuquerque, New exico, U. S. Weather Bureau, [1948]. 37+p. chiefly tables. **DWB**—Factors affecting evapora- on are enumerated: temperature, wind movement, relative humidity of air, salinity, nature of rface, barometric pressure, aspect or exposure and, finally, type of equipment (evaporation pan, servoirs, etc.). Locations of stations in and near New Mexico are shown on chart. Describes pe of equipment in general use by U. S. Weather Bureau. Data are presented *in extenso* for 5 stations in New Mexico and 14 in Arizona, Colorado and Texas. Monthly and annual averages totals since as early as 1914 up to 1947 are included. (*Same item as* 3.4–46, April 1952, *MAB.*) *ubject Headings:* **1. Evaporation data 2. Evaporation measurement 3. New Mexico. I. U. S. eather Bureau.**—*M.R.*

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10K–2 551.573(438.2)

Schmuck, Adam, **Przebieg dobowy parowania we Wrocławiu.** [Diurnal course of evaporation t Wrocław.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, No. 1/4:72–78, **1949.** 4 tables, refs., English summary p. 78. **DWB.** Also his: **Wiatr a temperatura i parowanie we Wrocławiu.** Wind as related to temperature and evaporation in Wrocław.] *Wrocławskie Towarzystwo Naukowe, race, Ser. B*, No. 12, **1949.** 42 p. 9 tables, 3 figs., 31 refs. On t-p: Acta Meteorologica et Clima- ologica, Universitatis Wratislaviensis. **DLC**—Evaporation of moisture from the ground was studied t 1947–1948 at the Wrocław Meteorological Observatory by means of a Wild evaporimeter installed 0 cm above the ground. Data are given on average total morning, afternoon and evening evapora- on rates for June, July, Aug. and Sept. and the total night evaporation for each day of these months. he amount of moisture evaporating before 1 p.m. is less than that evaporating after that hour. vaporation at night increases when there is strong wind. The second paper presents an analysis f the correlation between wind direction and evaporation, considering temperature, relative humidity nd wind speed. Maximum evaporation occurs with SE winds. (*Same item as* 2.5–121 and 6.9–208, lay 1951 and Sept. 1955, *MAB.*) *Subject Headings:* **1. Evaporation data 2. Wind-evaporation elationships. 3. Wrocław, Poland.**—*I.L.D., A.M.P.*

10K–3 551.582.1/2(675)

†*Vandenplas, A., **Données complémentaires sur le climat du Congo Belge.** [Supplementary ata on the climate of the Belgian Congo.] *Belgium. Institut Royal Météorologique, Mémoires,* ol. 33, **1949.** 73 p. numerous tables and figs. Bibliog. at end of each chapter. **DLC** (QC991.- 7V3)—A description and analytic discussion of the humidity, evaporation, solar radiation and loudiness in the Belgian Congo. Ch. 1, **Humidity,** contains a list of the temperature-humidity ecording stations in the Belgian Congo; the formulas for expressing atmospheric pressure and elative humidity; the instrumentation for recording relative humidity; annual and monthly dis- ribution of humidity; annual variation of relative humidity, vapor pressure and saturation deficit; iurnal variation of relative humidity and variability of atmospheric humidity. Ch. II, **Evaporation,** iscusses the instrumental measurement of evaporation including the Piche and Wild evaporimeters; onthly, annual and diurnal variation of evaporation; variability of evaporation; annual and daily mplitudes of evaporation and the annual amount of possible and effective evaporation. Ch. III, **adiation, insolation and cloudiness,** contains an account of measurement of global radiation and s measurement with the Bellani (principle of distillation) instrument; monthly, annual and diurnal ariation of global radiation and its variability and annual and daily variation of insolation and oudiness. Numerous graphs and tables are interspersed in the text and extensive data on humidity nd evaporation are included as appendices to Ch. 2 and 3, respectively. (*Same item as* 10.1–313, an. 1959, *MAB.*) *Subject Headings:* **1. Climatic data 2. Climate of the Belgian Congo 3. Evap- ration 4. Belgian Congo.**—*I.L.D.*

1950

10K–4 551.573

Čadež, M., **O toploti isparavanja.** [On the heat of vaporization.] *Yugoslavia. Hidro- eteorološka Služba. Hidrometeorološki Glasnik*, 3:19–25, **1950.** 5 refs., eqs. In Croatian; French ummary p. 25. **DWB**—The heat of vaporization of water is determined from a theoretical ap- roach. Equations accounting for internal and external heat (the former equivalent to the power cohesion of water molecules, the latter required to create an expansion of water under external ressure) necessary to effect evaporation under a given pressure and temperature are developed and ommented on. (*Same item as* 3.11–172, Nov. 1952, *MAB.*) *Subject Headings:* **1. Evaporation heory 2. Heat of vaporization.**—*G.T.*

10K–5 551.573:551.464(265/

Hanzawa, Masao, **On the annual variation of evaporation from the sea-surface in the Nor Pacific Ocean.** *Oceanographical Magazine*, Tokyo, 2(2):77–82, June **1950.** 3 figs., table, 5 ref equation. **MH-BH**—Evaporation in the North Pacific Ocean has been calculated from data continuous observation at fixed points by means of the formulas of SVERDRUP and JACOBS. In t North Pacific the maximum of evaporation occurs in fall and winter and the minimum in ear summer. The evaporation data are compared with those obtained by WÜST. No linear relationsh could be established between evaporation and change in chlorinity; this is explained by the fa that chlorinity is controlled by the movement of water. (*Same item as* 3.5–228, May 1952, *MA Subject Headings:* **1. Sea surface evaporation 2. Evaporation from seas 3. Chlorinity 4. Ocea ographic research 5. North Pacific Ocean. I. Wüst, G.**—*I.L.D.*

10K–6 551.573:551.551:551.578.462(48

Köhler, Hilding, **On evaporation from snow surfaces.** *Arkiv för Geofysik*, 1(8):159–185, 195 8 figs., 5 tables, 8 refs., 35 eqs. **DWB**—The theory of turbulent diffusion which controls evaporati from the ground is developed after TAYLOR, SUTTON and others. Curves are derived for determini evaporation as a function of wind and fetch. Observations made by the author from 1918–1925 Haldde Observatory in northern Norway are tabulated and the turbulence and evaporation co pared with theory. Sources of errors listed. Condensation also calculated for different wi directions. (*Same item as* 2.5–119, May 1951, *MAB.*) *Subject Headings:* **1. Evaporation of sn 2. Condensation 3. Norway.**—*M.R.*

10K–7 551.573:551.579:551.4

*†Leonov, A. K., **Opyt primeneniia tsirkuliatsionnoĭ teorii B'erknesa dlia opredeleniia vodno balansa Iaponskogo Moria.** [Experiment in application of Bjerknes' circulation theory to t determination of the water balance of the Sea of Japan.] (In: Akademiia Nauk SSR and Ge grafícheskoe Obshchestvo SSSR, **Pamiati Iuliia Mikhailovicha Shokal'skogo: sbornik statei i m terialov.** Vol. 2, pub. Moscow, **1950.** p. 83–183. 56 figs., 24 tables, 34 refs.) **DLC** (GC30.S48A —One of the most comprehensive works on the water balance of a single sea. It is based on numero Japanese and Soviet oceanographic expeditions. A circulation map shows a cyclonic eddy north 39°N. Isotherms in different depths are given for a part of the North Pacific east of Japan. Curre measurements and isotachs are presented for the straits and the annual course of total discharges computed. Schematic isohyets for winter, summer and the year are based mainly on coastal statio giving a total of 1390 km³ (1330 mm) for the year. Annual runoff from the land amounts to 2 km³. Evaporation maps are based on observations near the shore made by OKADA. These da allow different interpretations for the whole sea. The total evaporation was estimated as 900 k (925 mm). Finally, the seasonal variations of the water level are discussed and their connecti with the varying monsoon activity shown. The oceanographer will be interested also in the detail treatment of tides. BJERKNES' circulation theory not discussed. (*Same item as* 4I–273, Sept. 19 *MAB.*) *Subject Headings:* **1. Water balance of seas 2. Evaporation from seas 3. Ocean curren 4. Sea of Japan.**—*A.A.*

1951

10K–8 551.573:551.579(265/2

Albrecht, Fritz, **Monatskarten der Verdunstung und des Wasserhaushaltes des Indischen u Stillen Ozeans.** [Monthly evaporation and water balance charts for the Indian and Pacific Ocean *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 29:22–39, **1951.** 8 figs., 2 tabl 25 refs. **DWB**—Using MACDONALD'S **Atlas of climatic charts of the oceans** and data on mont air and water temperatures and wind velocities over the oceans, the author calculated evaporati between 50°N lat. and 45°S lat. by means of SVERDRUP'S formula. Evaporation on islands and land adjoining the oceans was determined by a formula which relates evaporation to monthly mea of saturation deficit and precipitation. The method of calculating evaporation charts is descri and maps showing evaporation and the difference between evaporation and precipitation for eve second month, are given. A discussion of the water economy in the Indo-Pacific region and of t water cycle in the atmosphere is presented. (*Same item as* 3.4–1, April 1952, *MAB.*) *Subj Headings:* **1. Evaporation charts 2. Hydrologic cycle 3. Indian Ocean 4. Pacific Ocean.**—*I.L.*

10K–9 551.573(2

Bossolasco, Mario, **Zur Frage der Verdunstung auf dem Meere.** [On the question of evapo tion from sea.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 3:40–46, **1951.** refs., table, 3 eqs. German, English and French summaries p. 40. **DWB**—Monthly evaporati observed at Mogadiscio is compared with that calculated by formulas of JACOBS and SVERDRU SAITO. The latter gives annual variation best but amounts are too small. Annual variation

aporation from Indian Ocean off Mogadiscio is discussed on this basis, giving an excess of 2.5 m' ar over precipitation. Evaporation is greatest in Dec.—April, least in S.W. monsoon. (*Same m as* 3 2–129. Feb. 1952, *M.A.B.*) *Subject Headings:* **1. Evaporation from seas 2. Indian Ocean.** *C.E.P.B.*

10K–10 551.573:551.551

Davies, D. P. and Walters, T. S., **The effect of finite width of area on the rate of evaporation to a turbulent atmosphere.** *Quarterly Journal of Mechanics and Applied Mathematics*, 4/4: 466–6, Dec. 1951. 2 figs., 7 refs., 37 eqs. Also: Payne, L. E., **A note of a paper by Davies and Walters.** *. Jnrl.*, 7/3: 283–286, Sept. 1954. 3 refs., 13 eqs. DWB—The paper analyzes the effect of dth on the rate of evaporation from a plane, rectangular saturated area into a fully turbulent air eam. The calculated evaporation per unit area is proportional to 'width' a, where a is less than ity, depending only on the turbulence. In adiabatic conditions $a = 0.86$. This was confirmed wind tunnel experiments.—In the note by Payne the integral solution given by Davies and alters for concentration of water vapor above a rectangular area is transformed into rapidly verging series more suitable for computation. (*Same item as* 3.5–227 and 6.5–208, May 1952 d May 1955, *M.A.B.*) *Subject Headings:* **1. Evaporation theory 2. Turbulence.**—*C.E.P.B.*

10K–11 551.577:551.573:551.464(261.265/266)

*Jacobs, Woodrow Conger, **The energy exchange between sea and atmosphere and some of its nsequences.** *California Univ., Scripps Institution of Oceanography, La Jolla, Bulletin*, 6(2), 51. 122 p., charts, graphs, tables, bibliog. Price: $1.00. DWB—Continuing his work pub-hed in 1942 and 1943, the author has calculated the mean seasonal and annual evaporation, sensible at loss and total heat loss from 5-degree squares of the sea surface for the North Atlantic and orth Pacific. Of greater interest to meteorologists are his calculations of the mean seasonal and nual precipitation by 10-degree squares over all oceans. From the preceding data the author is le to present calculations of the seasonal and annual values of the total convective energy received the atmosphere over the Northern Hemisphere oceans. By-products of the investigation are asonal and annual charts of E-P and an annual chart of salinity advection for the North Pacific d North Atlantic. Results are presented in logical order, by means of tables, graphs, charts and ok diagrams as well as in text. (*Same item as* 3.4–2, April 1952, *M.A.B.*) *Subject Headings:* **Hydrologic cycle 2. Energy exchange sea-atmosphere 3. Evaporation from seas 4. Precipitation over oceans 5. North Atlantic 6. North Pacific.**—*M.R.*

10K–12 551.573(569.4)

Rosenan, N., **The measurement of evaporative power in Israel.** *Israel. Meteorological rvice, Ser. A, Meteorological Notes*, No. 1, 1951. 11 p., fig., 4 tables, 3 refs. DWB—Tabulates d discusses mean evaporation, day and night means and extremes for 1940–49, obtained by PICHE aporimeter in standard screens at a number of stations in Palestine and Transjordan. They show reased evaporation from the coast inland, with height, and from north to south in the Jordan t. Evaporation is related to saturation deficit and wind speed. (*Same item as* 2.10–126, Oct. 51, *M.A.B.*) *Subject Headings:* **1. Evaporation 2. Israel.**—*C.E.P.B.*

10K–13 551.506.3(569.4)551.573:551.508.72

*Rosenan, N. and Shur, Z., **The measurement of evaporation according to the Piche method.** *rael. Meteorological Service, [Publication], Ser. E*, No. 1, 1951. 16 p., 2 figs., 5 tables. In ebrew; legends in Hebrew and English. DWB (M055 185se)—Evaporation data obtained in rael by means of Piche evaporimeters are tabulated. The tables presented give: mean daily aporation for each month of the year for 24 stations; mean evaporation during the day and during e night; mean extremes of daily evaporation and absolute mean extremes. All values are for the riod 1940–49. A graph is also presented, showing evaporation as a function of saturation deficit d wind velocity, based upon 180 daily Piche evaporimeter measurements at Helwan, Egypt in 1936. *bject Headings:* **1. Evaporation data 2. Evaporation measurements 3. Piche evaporimeter Israel.**—*G.T.*

10K–14 551.578.11:551.573

Shvets, M. E., **Ob isparenii kapli v potoke.** [On evaporation of drops in an air current.] *S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby, Informatsionnyi Sbornik*, 1:37–41, 51. fig., 6 refs., 16 eqs. DLC—An analysis of evaporation processes of a spherical drop with erage values of Reynolds numbers for the stream blowing around the drop. The author deter-ned mathematical expressions for the evaporation of an immobile drop, the evaporation in a w of moderate speed and the changes of radius of a drop during its fall. (*Same item as* 4.1–194, n. 1953, *M.A.B.*) *Subject Heading:* **1. Evaporation of raindrops.**—*N. T. Zikeev.*

10K–15 551.573(26

†Sverdrup, Harald Ulrik (*Norwegian Polar Inst., Oslo*), **Evaporation from the oceans.** (In **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 1071–1081 3 figs., 2 tables, 30 refs., 37 eqs.) **DWB**—The various methods for determining evaporation fron the ocean reviewed by the author are as follows: (1) evaporation from the oceans determined b extrapolation of values from land; (2) direct measurements of evaporation at sea; (3) evaporatio from the oceans computed from energy considerations and (4) evaporation from the oceans compute from meteorological elements. The history of each method is given; the fundamental equations an developed, the theoretical considerations are analyzed and the results obtained are presentec (*Same item as* 4.7–8, July 1953, *MAB.*) *Subject Headings:* **1. Evaporation from seas 2. Evaporatio measurement techniques 3. Compendium articles.**—*I.L.D.*

10K–16 551.573:551.578.1

Tverskaia, N. P., **Temperatura ispariaiushchikhsia kapel'.** [Temperature of evaporatin drops.] *Akademiia Nauk SSSR, Izvestiia. Ser. Geogr. i Geofiz.*, 15(1):74–81, **1951.** fig., 6 table 4 refs., 3 eqs. **DWB**—By assuming that a drop behaves like a psychrometer, the author derive from the psychrometric formula an expression for determining theoretically the temperature o evaporating drops. The expression is $T_d = T_a - A(E_d - e)$; T_d = temperature of the drop; T_a = tem perature of the air; E_d = vapor pressure of the drop; e = vapor pressure of the air; A = the psychro metric content. Value of A was determined experimentally by the use of a special chamber i which the temperature of the drops was measured with a thermocouple attached to a mirror ga vanometer. Values for A are determined in moving and in still air and for supercooled and freezin drops. They ranged between 1.7 and 2.1. A nomogram for calculating the temperature of evapora ing drops under any atmospheric condition is given. (*Same item as* 3.9–180, Sept. 1952, *MAB* *Subject Headings:* **1. Evaporation of raindrops 2. Raindrop temperature data.**—*I.L.D.*

10K–17 551.573:551.556.8:551.526.6(262.8/.9

Zubov, N. N., **Nekotorye osobennosti isparenііa v more.** [Some characteristics of evaporatio from seas.] *Voprosy Geografii*, Moscow, No. 24:380–392, **1951.** refs. **DLC**—A very lucid qualit tive discussion of the process of evaporation from large water surfaces. Evaporation is eith physical or mechanical. The former involves a loss of heat by the evaporating surface; the latt does not lead to a decrease in surface temperature but is caused by wind action. The mechanism mechanical evaporation is described and its role in the total evaporation process, in the distributio of atmospheric salts, its effect on the chemical composition of the Sea of Aral and of the Caspia Sea are discussed. The author believes that mechanical evaporation is more important than physic evaporation and tests the regions where this is particularly true. (*Same item as* 3.10–217, Oc 1952, *MAB.*) *Subject Headings:* **1. Evaporation from water surfaces 2. Ocean-atmosphere inte action 3. Saline nuclei 4. Wind effects on sea surface 5. Middle Asia 6. Caspian Sea 7. Lak Aral.**—*I.L.D.*

1952

10K–18 551.573:551.509.

Ferguson, **J.** (*Res. Dept., Imperial Chemical Industries, Ltd., Northwich, Eng.*), **The rate natural evaporation from shallow ponds.** *Australian Journal of Scientific Research, Ser. A, Physic Sciences*, 5(2):315–330, June **1952.** 4 figs., 3 tables, 15 refs., 18 eqs. **DLC**—The meteorologic factors determining the rate of natural evaporation from "free" water surfaces are: the radiat energy supply from the sun and atmosphere, the air temperature in contact with the surface, t absolute humidity of the air, and the wind velocity and turbulence over the surface. The releva relationship of these factors has been expressed in a differential equation, whose solution, giv proper numerical instantaneous values of the determining factors and their variation with tim yields the value of the depths. Using different values of the parameters, a number of solutions of t equation were obtained by means of a differential analyzer. It is shown that, provided the dep of the water is greater than about 16 cm, a simpler equation using mean values of the radiant ener flux and the air temperature over short periods of time yields almost identical results. The u of this equation for the prediction of evaporation from shallow ponds exposed to known clima conditions is discussed. (*Same item as* 4.5–153, May 1953, *MAB.*) *Subject Headings:* **1. Evaporati rate 2. Evaporation forecasting.**—*Author's abstract.*

10K–19 551.573(261,265/26

*Fleming, Richard H. (*U. S. Hydrographic Office, Div. of Oceanog.*), **Evaporation from the sea a source of moisture for rainfall in the United States.** (In: U. S. Congress. House. Committee Interior and Insular Affairs, **Physical and Economic Foundation of Natural Resources,** Vol. 2:4– **1952.** 3 tables, 7 figs., 20 refs.) **DWB**—A summary of accumulated knowledge on the hydrolo

ycle between seas and continent, based primarily on the works of WÜST and JACOBS. The distribution and latitudinal means of evaporation over the North Atlantic and the North Pacific are hown, and its annual and diurnal variation briefly discussed. *Subject Headings:* **1. Hydrologic cycle Evaporation from seas 3. North Atlantic 4. North Pacific.**—*A.A.*

10K–20 551.573:551.551

Gandin, L. S. and Soloveĭchik, P. E., **K teorii isparenііa s ogranichennykh vodoemov.** [Theory evaporation from limited water containers.] *Akademiia Nauk SSSR, Doklady*, 86(1):55–57, ept. 1, **1952.** 5 refs., 4 eqs. **DLC**—The authors give the integral $q(x,y,z)$ for the differential quation

$$u\frac{\partial q}{\partial x} = K_x\frac{\partial^2 q}{\partial x^2} + K_y\frac{\partial^2 q}{\partial y^2} + \frac{\partial}{\partial z}\left(K_z\frac{\partial q}{\partial z}\right).$$

=specific humidity; u =wind velocity; K_x, K_y =coefficients of horizontal exchange; K_z =vertical change coefficient; x =axis in the wind direction. For the exchange coefficient K, both horizontal nd vertical, power functions are assumed, as well as for the wind velocity. Border conditions: given distribution $q_z = 0 = F(x,y)$ and limited q to infinity in each direction. The solution for the istribution of specific humidity in space for a limited water surface in this very general case is a omplicated combination of Bessel and Γ functions. (*Same item as* 4A–202, Jan. 1953, *MAB.*) *ubject Headings:* **1. Evaporation theory 2. Turbulent exchange.**—*A.A.*

10K–21 551.573(437)

Jílek, Josef, **Plošné rozdělení ročního výparu vody v Čechách, na Moravě a ve Slezsku.** [Areal istribution of annual evaporation in Bohemia, Moravia and Silesia.] *Meteorologické Zprávy*, rague, 5(3):77–78, **1952.** chart. **DLC**—The chart presented and briefly explained shows isolines f average annual total evaporation for the western part of Czechoslovakia, with values ranging rom 370 to 530 mm. (*Same item as* 8.1–262, Jan. 1957, *MAB.*) *Subject Headings:* **1. Areal evaporaon distribution 2. Czechoslovakia.**—*G.T.*

10K–22 551.573(437.6):551.508.72

*Kacvinský, Martin, **Výpar vody v Hurbanove (1901–1950, 1941–1950).** [Evaporation in Hurbanovo, 1901–1950, and 1941–1950.] *Meteorologické Zprávy*, Prague, 5(1):7–11, **1952.** 5 tables, 2 refs., eqs. German summary p. 7. **DLC**—Evaporation measurements in Hurbanovo have been ade since 1890 by means of scale-type Wild evaporimeters with 250 cm² evaporation pans. Data n evaporation at Hurbanovo are tabulated for a shelter (1901–1950) and for a free surface (1941–950). The values presented include monthly and daily means and extremes, number of days ithout evaporation, monthly values of maximum possible evaporation, and actual evaporation om the ground covered with vegetation. Added are a table of monthly means of various climatic ements (temperature, precipitation, relative humidity, sunshine, cloudiness) and one of climatic alues according to THORNTHWAITE'S classification. (*Same item as* 8.1–263, Jan. 1957, *MAB.*) *ubject Headings:* **1. Evaporation measurement 2. Wild evaporimeter 3. Thornthwaite's classifiaon 4. Hurbanovo, Czechoslovakia.**—*G.T.*

10K–23 551.573(84) 551.577.2(84)

Morales N., Héctor, **Evaporación.** [Evaporation.] *Nimbus*, La Paz, 3(8/9):6–16, Jan./June **952.** fig., 3 refs.—After a general discussion of problems involved in computing evaporation, the uthor analyzes the evaporation regime of the high plateau corresponding roughly to the territory the Department of Oruro (52,800 km²). This is the coldest region of Bolivia, with temperatures ometimes as low as −23°C. The area extends to an altitude of 3,700 m. It includes the lakes oopó and Coipasa and the Desaguadero River with its tributaries. Five-year annual mean preipitation values are presented for various parts of the region. Evaporation from Lake Poopó is stimated. (*Same item as* 4.8–162, Aug. 1958, *MAB.*) *Subject Headings:* **1. Evaporation from ateaus 2. Precipitation amounts 3. Bolivia.**—*G.T.*

10K–24 551.573(581)

*Neubauer, H. F., **Beobachtungen über die Verdunstungsgrösse in Afghanistan.** [Observations n magnitude of evaporation in Afghanistan.] *Wetter und Leben*, 4(1/2):18–24, Feb. **1952.** 2 figs., tables.—Approximately hourly measurements of evaporation were made over a period of 60 days Afghanistan using a Piche evaporimeter with white filter paper. Tables giving maximum evaporaon, intensities and attendant conditions, a comparison of evaporation intensities among various eas in Afghanistan and mean daily values of evaporation intensity at Kabul over various surfaces, d graphs showing daily march of evaporation on specific days are presented. The highest evapora-

tion occurred between 1230 and 1400 hours at height of 2 to 3 cm. (*Same item as* 3.11–173, No 1952, *MAB.*) *Subject Headings:* **1. Evaporation data 2. Afghanistan.**—*I.L.D.*

10K–25 551.573(267.

Neumann, J., **Evaporation from the Red Sea.** *Israel Exploration Journal*, 2(3):153–162, 195 table, refs., 6 eqs. **DLC**—From observations on Daedalus Reef (25°N, 35°E) energy balance of sea su face was calculated, giving an annual evaporation of 211 cm. A check calculation from vapor pressu gradient gave 215 cm. Daily amounts vary from 0.4 cm (Feb.) to 0.8 cm (Aug.), with a seconda minimum in June. Estimated evaporation 29°N, 200 cm; 20°N, 225 cm; 15°N, 235 cm; avera for whole Red Sea, 210 cm. (*Same item as* 4.5–154, May 1953, *MAB.*) *Subject Headings:* **1. Eva oration from seas 2. Red Sea.**—*C.E.P.B.*

10K–26 551.501:551.573:551.57

Popov, O. V., **Soveshchanie po voprosam metodiki nabliudeniĭ nad ispareniem s pochv** [Conference on the methods of observation of evaporation from soil.] *Meteorologiia i Gidrologia* No. 7:51–53, **1952. DLC**—The Hydrometeorological Service of the U.S.S.R. called a special co ference on March 18–20, 1952 to discuss this problem. Five special reports were presented by t State Hydrological Institute, Central Geophysical Observatory and Central Institute of Weath Forecasting. The Hydrological Institute carried out experiments at special stations. Evaporati observations were taken at Valdai (near Leningrad), Kamennaia Steppe (Voronezh district), D bovka hydrologic station (Rostov district), at the site of the Turkmen Canal construction and agrometeorological stations at Yelshanka (Kuibyshev district) and Poltava. At the Valdai stati a complex installation for observation of soil evaporation has been operating since 1950. It a monolith of soil in its natural state with a surface of 5 m², about 2 m deep and weighing about tons. It has a special installation for weighing moisture content with an accuracy of up to 1.1 m Main emphasis was placed on the calculation of evaporation by the heat balance method. T conclusion was reached that the heat balance method is the most applicable. Calculation of evapor tion by the use of lapse rate data has been worked out at the Central Institute of Weather Forecastin The conference approved a proposal for a more complete investigation of the nature of process accompanying evaporation inside the soil and for conducting comparative observations by differe methods. (*Same item as* 4.11–30, Nov. 1953, *MAB.*) *Subject Headings:* **1. Evaporation from s 2. Evaporation measurement.**—*N. T. Zikeev.*

10K–27 551.573:551.57

Schubach, Karl, **Verdunstungs- und Wasserhaushaltsuntersuchungen an verschiedenen Böde** [Evaporation and water economy investigations in different soils.] *Germany. Deutscher Wett dienst in der US-Zone, Berichte*, No. 35:189–193, **1952.** 4 figs., 2 tables, 3 refs. **DWB**—At Giess daily measurements of evaporation, soil moisture and percolation down to 25 cm were made 1950/51 with Popov evaporimeter and small Russian lysimeter, in sand, loess and humus. T results are summarized and discussed in detail. (*Same item as* 3.10–214, Oct. 1952, *MAB.*) *Subj Headings:* **1. Evaporation 2. Soil moisture 3. Percolation.**—*C.E.P.B.*

10K–28 551.506:551.579 1:551.573(766):551.48

*†U. S. Navy Electronics Laboratory, San Diego, Calif., **Water-loss investigations, Vol 1, La Hefner studies technical report.** *U. S. Geological Survey, Circular*, 229, **1952.** 153 p. 29 tabl 98 figs., refs., 108 eqs. Appendix: **Symbols and dimensions.** *U. S. Navy Electronics Laborato San Diego, Calif., NEL Report*, 327, **1952.** Also: **Vol. 2, Lake Hefner studies base data repo** *U. S. Geological Survey, Professional Paper*, No. 270, **1954.** 300 p. almost entirely tables. A issued as: *U. S. Navy Electronics Lab. NEL Report*, No. 328. Also: **Lake evaporation.** *Meteo logical Magazine*, London, 83(960):52–56, Feb. **1954.** Also: Harbeck, G. Earl, Jr., **The Lake Hefn water-loss investigations.** *International Union of Geodesy and Geophysics. Association of Scienti Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 437–443. 6 refs., eqs. **DW —Vol. 1** of this extensive report contains excellent studies by G. Earl Harbeck, R. Ernest, Max Kohler and others, on evaporation from Lake Hefner as computed from special measurements a the use of mass-transfer and energy-budget calculations. (For detailed contents and abstract Vol. 1 *see* 10H–32, Aug. 1959, *MAB.*) **Vol. 2** gives the original data upon which the analyses Vol. 1 are based. For most elements the period of record is April 1950–Aug. 1951. The article **Meteorological Magazine** contains a Meteorological Office (Great Britain) discussion of Vol. 1 the Lake Hefner report. Various criticisms are made, and the use of accurate data to test evapo tion formulas and energy-budget described in the volume is reported. HARBECK's paper (in **IU Transactions**) is a summary of the 1950–51 Lake Hefner investigations. (*Same item as* 5.3–13 a 6.8–16, March 1954 and Aug. 1955, *MAB.*) *Subject Headings:* **1. Evaporation from lakes 2. Wa loss investigations 3. Limnology 4. Lake Hefner, Okla. I. U. S. Weather Bureau II. U. Geological Survey.**

10K–29 551.511 551.573

Yih, Chia-Shun, **Laminar free convection due to a line source of heat.** *American Geophysical Union, Transactions*, 33(5, Pt. 1):669–672, Oct. **1952.** 35 eqs. **DLC**—The solutions of the velocity and temperature distribution in the fluid of free convection for the Prandtl numbers 2/3 and 7/3 were arrived at by assuming a line source of heat in an infinite horizontal plane above which the fluid was isothermal and at rest, and the free convection induced by the difference of specific weight due to temperature variation in the fluid. The solutions are applicable to the analogous case of laminar evaporation of water into air. (*Same item as* 5.2–103, Feb. 1954, *MAB.*) *Subject Headings:* **1. Convection 2. Evaporation theory.**—*W.N.*

1953

10K–30 551.573 551.579.4:551.481.1(492)

Bonython, C. Warren and Mason, B., **The filling and drying of Lake Eyre.** *Geographical Journal*, 119(3):321–330, Sept. **1953.** 3 figs., 2 tables, 3 photos. **DLC**—Owing to abnormal rains in N. and E. Australia in summer 1949–50 Lake Eyre North (3000 sq mi) was submerged. Monthly rainfalls 1949–50 tabulated. Former floodings are listed. Drying up was complete by beginning of 1953. Levels were measured during 1951: evaporation calculated as 94 in., compared with 80 in. calculated from energy balance. (*Same item as* 5.9–213, Sept. 1954, *MAB.*) *Subject Headings:* **1. Water level variations 2. Evaporation from lakes 3. Lake Eyre, Australia.**—*C.E.P.B.*

10K–31 551.573:533.17

Callaghan, Edmund E. (*Lewis Flight Propulsion Lab., Cleveland*), **Analogy between mass and heat transfer with turbulent flow.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, 3045, October **1953.** 19 p. diagrs. **DWB**—An analysis of combined heat and mass transfer from a flat plate has been made in terms of PRANDTL's simplified physical concept of the turbulent boundary layer. The results of the analysis show that for conditions of reasonably small heat and mass transfer, the ratio of the mass- and heat-transfer coefficients is dependent on the REYNOLDS number of the boundary layer, the PRANDTL number of the medium of diffusion, and the SCHMIDT number of the diffusing fluid in the medium of diffusion. For the particular case of water evaporating into air, the ratio of mass-transfer coefficient to heat-transfer coefficient is found to be slightly greater than unity. (*Same item as* 6.3–215, March 1955, *MAB.*) *Subject Headings:* **1. Boundary layer theory 2. Evaporation theory 3. Heat transfer.**—*U. S. NACA abstract.*

10K–32 551.573:551.578.46

Diamond, Marvin, **Evaporation or melt of snow cover.** *U. S. Snow, Ice and Permafrost Research Establishment, Research Paper*, No. 6, Nov. **1953.** 6 p. 2 figs., 5 tables, 10 refs., 2 eqs. **DWB**—Analysing the heat balance of the snow surface, it was found that very little evaporation can occur without melting. The evaporation potential decreases with higher air temperatures. A nomogram shows the conditions for condensation or evaporation from a snow surface depending on air and snow temperature and relative humidity. (*Same item as* 6.3–218, March 1955, *MAB.*) *Subject Headings:* **1. Snow melting 2. Evaporation of snow.**—*A.A.*

10K–33 551.573:551.578.462

Kehrlein, Oliver; Serr, Eugene, Sr. (*both, Sierra Club*); Tarble, Richard D. and Wilson, Walter T. (*both, U. S. W. B.*), **High Sierra snow ablation observations.** *Western Snow Conference, 21st, Boise, Idaho, April 1953*, [*Proceedings*], p. 47–50. Also: Church, James E., **Further on the evaporation and melting of snow at high altitudes.** *Ibid.*, p. 51–52. fig., table, 5 refs. **DWB**—Gives hourly data for two days for snow melt, dry and wet bulb temperature, sunshine and other weather conditions. The measurements were made on the crest of Mt. Whitney. Snow evaporation or condensation affected the total ablation only very little, but apparently much melt water is later evaporated from moist soil and water surfaces. Church stresses that evaporation of snow is definitely important in the total balance, while the Mt. Whitney observations were made during the summer with prevailing snow melt. (*Same item as* 6.8–278, Aug. 1955, *MAB.*) *Subject Headings:* **1. Snow ablation 2. Evaporation of snow 3. Mt. Whitney, Calif.**—*A.A.*

10K–34 551.573:551.481.1(569.4)

*Neumann, J., **Energy balance and evaporation from sweet water lakes in the Jordan rift.** *Research Council of Israel, Bulletin*, 2:337–357, **1953.** 4 figs., 8 tables, 27 refs., 20 eqs. Reprinted as *Israel. Meteorological Service, Series A, Meteorological Notes*, No. 10, **1954.** **DWB**—Evaporation was calculated monthly for Lakes Hula and Tiberias on the Jordan, from energy interchange between lakes and atmosphere, using air temperature, vapor pressure, cloud amount, and lake temperatures at various depths. For Lake Tiberias, average depth 24 m, area 167 km², annual evaporation is 162 cm, maxima Oct. (24 cm) and March (8.5), minima May (5) and Jan. (6.5). For Lake Hule

(depth 1.7 m, 14 km²) evaporation is 168 cm, with single maximum (28.5) in July and minimum (2.5) in Dec. (*Same item as* 5.8–185, Aug. 1954, *MAB.*) *Subject Headings:* **1. Evaporation from lake 2. Lake Tiberias, Israel 3. Waters of Merom.**—*C.E.P.B.*

10K–35 551.506.3:551.573(71

*Robertson, George W. (*Comp.*), **Evaporation measurements at branch units of the Experimental Farms Service throughout Canada.** Ottawa, Experimental Farms Service, **1953.** 19 p. mostly tables. **DWB**—Evaporation data for 29 stations in Yukon, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island are presented as averages for each month (May to Sept.), and actual data for each month of each year. Several stations have records from 1922–1952, inclusive. In addition, the coordinates, mean temperature, total average rainfall and hours of sunshine are given for each station. The details of construction, exposure, installation and operation of tanks are given. (*Same item as* 6.2–23, Feb. 1955, *MAB.*) *Subject Headings:* **1. Evaporation data 2. Canada. I. Canada. Experimental Farms Service, Ottawa.**—*M.R.*

10K–36 551.573:551.311

Seliakov, N. Ia., **Isparenie l'da v period ego kristallizatsii.** [Evaporation of ice during its crystallization.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:460–462, **1953.** 3 refs. **DLC**—Experimental determination of evaporation from ice during and after its formation was made in a chamber without heat and with good ventilation, so that temperature and humidity conditions were similar to those in the open air. The influence of the crystallization heat on the increase of evaporation during ice formation was detected. This influence contributes to the high evaporation rate often observed during night frosts in spring and autumn. (*Same item as* 5.10–171, Oct. 1954, *MAB.*) *Subject Headings:* **1. Evaporation from ice 2. Ice formation.**—*N. T. Zikeev.*

10K–37 551.573:551.481(43

Skibniewski, Leonard, **Czynniki wpływajace na wysokość parowania z jeżior na nizu polskim.** [Factors influencing the intensity of evaporation from the lakes of the Polish Lowland.] *Gospodarka Wodna*, Warsaw, 13(6):209–210, June **1953.** 2 figs., 2 tables, ref. **DLC**—A paper in which the author objects to DERSKI's assertion that besides atmospheric moisture deficit and water temperature the temperature of the air is the most decisive factor in evaporation from lakes. On the basis of results of instrumental investigations carried out in a series of Polish lakes, it is shown that as is from the water temperatures, the most important factors influencing the intensity of evaporation are: atmospheric moisture deficit, humidity and the duration of sunlight. The author concludes that while from April to July the intensity of evaporation is influenced by three parallel factors: water temperature, moisture deficit and duration of sunlight, in the period of July—Aug. it is only the water temperature that accelerates evaporation, the intensity of which is reduced by the decrease of moisture deficit and insolation. The effect of both of the last factors prevails and therefore the intensity of evaporation decreases in spite of the rise of the water temperature. (*Same item* 5.11–139, Nov. 1954, *MAB.*) *Subject Headings:* **1. Evaporation from lakes 2. Poland.**—*A.M.P.*

10K–38 551.501:551.573(43

Stenz, Edward, **O parowaniu z wolnej powierzchni sbiornikow wodnych.** [Evaporation from the free surface of water reservoirs.] *Gospodarka Wodna*, Warsaw, 13(6):211–213, June **1953.** 8 refs. **DLC**—The deplorable state of study of evaporation from open surfaces of reservoirs in Poland is described and discussed. After having reviewed and criticized the various methods of direct measurement (WILD, PICHE, BINDEMANN evaporimeters), of theoretical determination by computation (DALTON, SEFAN-SZYMKIEWICZ, JEFFREYS methods) or empirical patterns (STELLING, ROHWER, TRABERT, THORNTHWAITE and others) in which evaporation is presented as a function of one factor or another, whereby consideration of other values is not excluded, the author sums up the actual state of the problem and presents a series of suggestions on how to improve it. (*Same item* 5.10–172, Oct. 1954, *MAB.*) *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation measurement techniques 3. Poland.**—*A.M.P.*

10K–39 697.9:551.5

Sutton, George E., **Roof spray.** *National Research Council, Wash., D. C. Building Research Advisory Board, BRAB Research Conference Report*, No. 5:137–140, **1953.** 5 figs. **DWB**—Two lawn sprays were set up on a flat asphalt roof (area 2400 sq ft) in Florida with thermostatic control at roof temperatures of 95, 100 and 105°F. Operation was efficient at 100°F, maintaining a ceiling temperature of 90°F compared with over 100°F with an unsprayed roof. Cost was less than half that of mechanical refrigeration, and may serve as a useful auxiliary to the latter. (*Same item* 7B–194, Feb. 1956, *MAB.*) *Subject Headings:* **1. Cooling methods 2. Evaporative cooling.**—*C.E.P.B.*

10K–40 551.573:551.584

Sutton, Oliver Graham (*Military Col. of Science, Shrivenham, England*), **Micrometeorology: study of physical processes in the lowest layers of the earth's atmosphere.** New York, McGraw-Hill, **1953.** Chapter 8: **Diffusion and evaporation.** p. 273–323. 6 figs., 47 refs., 86 eqs. **DWB**—The theoretical study of evaporation is reviewed with emphasis on the diffusion method. Evaporation from limited areas, solution of the two-dimensional problem, the effect of rough surfaces and concentrations outside the evaporating strip are considered, including the mathematical derivations and literature citations. The energy balance method is briefly touched upon. The problem of evaporation measurement is also taken up and the view is expressed that "the status of the conventional evaporimeter as a worthwhile meteorological instrument is more than doubtful." (For abstract on the whole book *see* 4.2–15, Feb. 1953, *MAB.*) *Subject Headings:* **1. Evaporation calculation 2. Diffusion theory 3. Evaporation measurement techniques.**—*G.T.*

1954

10K–41 551.573:627.81

*†Braslavskiĭ, A. P. and Vikulina, Z. A., **Normy ispareniia s poverkhnosti vodokhranilishch.** [Rates of evaporation from the surface of reservoirs.] Ed. by A. I. Chebotarev. Leningrad, Gidromet. Izd-vo, **1954.** 211 p. 24 figs., 94 tables (also p. 132–209), 77 refs., numerous eqs. At head of title: Ministerstvo Sel'skogo Khoziaĭstva SSSR. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby. Gidrologicheskiĭ Institut. **DLC** (TD395.B66)—This outstanding monograph on methods for determining the amount of evaporation from the surface of water reservoirs summarizes the results of investigations which have been carried out by the State Hydrological Institute over a period of years. The regime of evaporation can now be calculated by taking into account the water balance and changing characteristics of the reservoir. Total evaporation from water reservoirs of medium size and 5 m depth is shown on a map covering European Russia and West Siberia. The work provides for an extensive use of the results in practical applications for designing and operating water reservoirs located on the plains of the U.S.S.R. The separate chapters discuss in detail: I. Empirical evaporation formula, II. Wind speed, III. Humidity and temperature of air, IV. Water temperature, V. Accuracy of calculations of evaporation by formula, VI. Evaporation from reservoirs, VII. Influence of vegetation on evaporation, VIII. Recommendations for calculation of evaporation by the suggested method, and IX. Examples of computations. Extensive computation tables are included in appendix. (*Same item as* 7.3–15, March 1956, *MAB.*) *Subject Headings:* **1. Evaporation from reservoirs 2. Evaporation estimation 3. U.S.S.R.**—*M.R. and N. A. Zikeev.*

10K–42 551.525:551.573

Brooks, F. A. and Rhoades, D. G. (*Agric. Exper. Station, Univ. of Calif., Davis*), **Daytime partition of irradiation and the evaporation chilling of the ground.** *American Geophysical Union, Transactions,* 35(1):145–152, Feb. **1954.** 5 figs., refs. p. 152. **DWB**—The present study concerns daytime conduction and convection at the ground; how added soil moisture magnifies the heat-flow cycle; and how latent heat of vaporization offsets the diurnal temperature cycles. Measured diurnal cycles of net radiation, conduction, and convection for dry ground are formalized to show how the amplitudes and phase lag of half-cycle temperature and conduction waves indicate the partition of energy at the ground surface. A series of four test plots of five acres each was studied during the spring frosts in a pear orchard near Lakeport. Two plots were disk-cultivated, and one of these was immediately flood-irrigated lightly. The observed diurnal magnitudes of heat flow were more than twice as great in the watered plot as in the unirrigated. The striking results are not the effect of disk cultivation but rather that of the chilling caused by application of water. The watered plot took more than ten days (in April) to recover from the evaporation chill (but then warmed up more than the other three plots and two weeks after flooding was definitely less liable to frost than the unwatered plots). These investigations have the considerable advantage of direct measurement of heat-conduction rates into and out of the ground. Much remains to be done, however, to establish empirical coefficients to be used with simplified formulas. The measurement of evaporation is an important future objective, but knowledge of total daily water loss from the soil can be used in the formulas to get a fair understanding of the diurnal thermal system. (*Same item as* 5.9–170, Sept. 1954, *MAB.*) *Subject Headings:* **1. Soil temperatures 2. Evaporation from soil 3. Convection 4. Frost prevention.**—*Authors' abstract.*

10K–43 551.510.42:551.551:551.573

Davies, D. R., **On diffusion from a continuous point source at ground level into a turbulent atmosphere.** *Quarterly Journal of Mechanics and Applied Mathematics,* 7(2):168–178, June **1954.** table, 6 refs., 35 eqs. **DWB**—The 2-dimensional theory of K. L. Calder (1949) is extended to 3 dimensions. A particular solution of the basic diffusion equation is obtained for a uniform continu-

ous fixed point source on a horizontal uniformly rough surface. Applied to neutral stability ove long grass it gives:

	Calc.	*Obs.*
Width of cloud at 100 m	37.0 m	35.0 m
Height of cloud at 100 m	10.5 m	10.0 m
Peak concentration 100 m downwind (mg/m³)	1.75	2.0
Decrease of peak concentration with distance from source	$X^{-1.58}$	$X^{-1.76}$

The theory is applied to evaporation from a limited saturated plane surface, showing that theoretica rate of evaporation per unit length is proportional to w^{1-m}, where w is width and m is a constan usually $<\frac{1}{2}$, in agreement with observation. (*Same item as* 6.2–101, Feb. 1955, *MAB.*) *Subje Headings:* **1. Smoke dispersion 2. Turbulent diffusion from a point source 3. Evaporation theory** —*C.E.P.B.*

10K–44 551.57

Hickman, K. C. D., **Maximum evaporation coefficient of water.** *Industrial and Engineerin Chemistry*, 46(7):1442–1446, July **1954.** 2 figs., table, 8 refs. Also: Hickman, K. C. D. and Torpe W. A., **Evaporation of resting water.** *Ibid.*, 46(7):1446–1450, July **1954.** 8 figs., 7 refs., 3 eq **DWB**—1) The consensus, backed by different experiments, has been that not more than one molecul of water in 25, approaching the surface from either side, actually merges with the interfacial laye This paper suggests that it is unreasonable to expect a fixed or characteristic evaporation coefficien for water (or other liquid). The relevant question, and one that does not yet appear to have bee answered satisfactorily, is whether there are conditions at which the evaporation coefficient of wat is unity. This paper answers the question affirmatively and thus removes water from the class anomalous liquids, as to evaporation. 2) Experiments described in this paper suggest that torpidit of water (resulting in very low evaporation coefficient) is due to a layer of chemical impurity on t water surface. (*Same item as* 6.2–233, Feb. 1955, *MAB.*) *Subject Heading:* **1. Evaporation rate.**— *From author's introduction, G.T.*

10K–45 628(54) 551.573 551.57

*India. Central Board of Irrigation, **Annual report (Technical), 1949, Part 1.** Issued by th Board, **1954.** 309 p. figs., tables, foot-refs., bibliogs. Foreword signed 1951. Its *Publication* No. 49. **DWB**—An elaborate and systematically organized report dealing with all aspects of th water supply and irrigation problem in India, Burma and Ceylon. Rain runoff, floods, ground wate soil erosion, soil moisture, artificial rainfall (p. 130), channel and engineering problems are discusse in separate sections and complete data in tabular and graphic form are included. On p. 107–11 is found an exhaustive treatment of evaporative losses from free water surfaces based on a coordinate research program recommended in 1946 and begun in May 1948. The effect of size of pan on evapora tion is shown for May–Nov. 1948 in graphs and tables. Other research and investigations are re ported. (*Same item as* 6.7–13, July 1955, *MAB.*) *Subject Headings:* **1. Rainfall runoff investigatio 2. Evaporative water loss investigation 3. India. I. Malhotra, S. L.** (*ed.*).—*M.R.*

10K–46 551.573:551.57

Kucera, C. L. (*Dept. of Botany, Univ. of Missouri, Columbia*), **Some relationships of evaporatio rate to vapor pressure deficit and low wind velocity.** *Ecology*, 35(1):71–75, Jan. **1954.** fig., tables, refs. **DWB**—A study was conducted during July and Aug. 1951 and Aug. 1952 at Columbi Missouri, using Livingston-type atmometers to determine evaporation rates with various moistu and wind conditions, day and night, in open sunlight and in a hickory grove. Mean rates a tabulated and all data plotted on scatter diagrams and segregated according to wind speed classe (using vapor pressure difference against evaporation, as arguments). Evaporation coefficients a given for each regression line and for the mean condition for all wind speeds. It was found th evaporation is a function of vapor pressure difference except under nocturnal inversion condition Correlation of evaporation rate to vapor pressure difference was >70%. Wind speed was n highly correlated, but narrowed the variance. (*Same item as* 6.9–235, Sept. 1955, *MAB.*) *Subje Headings:* **1. Evaporation rate 2. Vapor pressure deficit 3. Columbia, Mo.**—*M.R.*

10K–47 551.509.615:551.575.1:551.57

Matsubara, S. and Okuda, S. (*Okayama Univ.*), **On the size of artificial fog for the productio of salt from sea water.** *Journal of Agricultural Meteorology*, Tokyo, 10(1/2):63–66, Dec. 195 2 figs., 5 tables, 5 refs., eqs. In Japanese, English summary p. 66. **DWB**—Evaporation of wat from fogs artificially made of sea water falling through unsaturated air is one method to produce sa Before adopting this method, it was necessary to determine the most effective drop size of fo which are made by a sprayer, considering the evaporating efficiency and horizontal distance of flig by wind. We studied drop size by field observations and simple numerical calculations and conclu

that the most effective drop diameter of fog is about 0.1–0.2 mm, when the height of jet of the sprayer is about 10 m for the wind velocity on the coast of Seto Inland Sea. (*Same item as* 10.4–259, April 1959, *M.A.B.*) *Subject Headings:* **1. Fog evaporation 2. Sea water evaporation.**—*From authors' abstract.*

10K–48 551.524.4:551.526.6:551.573(262.5)

*Neumann, J. and Rosenan, N. (*Met. Service, Tel Aviv, Israel*), **The Black Sea: energy balance and evaporation.** *American Geophysical Union, Transactions*, 35(5):767–774, Oct. **1954.** fig., 5 tables, 19 refs., 6 eqs. **DWB**—The energy equation is applied to data of four areas of the Black Sea. The data used are as follows: air temperature, pressure and cloudiness (LANDSBERG'S 1945, bimonthly isopleths); humidity of air (estimates based on humidity data of coastal stations); sea surface temperatures (observations by British ships); and sea surface salinity (17°/₀₀, SVERDRUP and others in 1946). The results indicate an average annual evaporation of 110 cm, approximately. As in the corresponding latitudes of the oceans, evaporation decreases from south to north and from west to east. Evaporation during the autumn-winter semester considerably exceeds evaporation in the remaining semester. The hydrologic balance determined by SVERDRUP and others for the Black Sea indicated an annual evaporation of 84 cm. It is suggested that the precipitation and runoff terms of that balance are larger to an extent needed to compensate for the larger value of evaporation derived from the energy balance. The terms precipitation and runoff are subjected to a re-examination. The authors' estimate of annual precipitation is in close agreement with that given by SVERDRUP (58 cm). By combining the figure for evaporation (energy balance) with the precipitation estimate and with data for the in- and outflow through the Bosporus, a runoff from the catchment to the sea amounting to 10 cm/year is required. Hydrographic data for the catchment available to the authors, first communicated by Russian authors after publication of SVERDRUP'S hydrologic balance for the sea, cover 92% of the catchment and account for a runoff of 91 cm/year. Thus, the evaporation figure derived from energy balance computations receives close support from hydrographic data. (*Same item as* 6.5–164, May 1955, *MAB.*) *Subject Headings:* **1. Energy exchange sea-atmosphere 2. Energy balance 3. Evaporation from seas 4. Black Sea.**—*Authors' abstract.*

10K–49 551.573:551.481

Neumann, J., **On the annual variation of evaporation from lakes in the middle latitudes.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):297–306, **1954.** fig., table, 20 refs., 5 eqs. English, German and French summaries p. 297–298. **DLC**—Heat balance of lakes is represented by: heat lost to atmosphere by evaporation and conduction = net radiation surplus at lake surface minus change of heat storage in lake. These four terms are evaluated monthly from available data. Results show that annual variation of evaporation from non-shallow lakes tends to be a double wave resembling that in oceans in similar latitudes, but earlier in phase by an amount depending on shallowness of lake. Minima occur in winter and in spring or early summer. (*Same item as* 5.8–188, Aug. 1954, *MAB.*) *Subject Heading:* **1. Evaporation from lakes.**—*C.E.P.B.*

10K–50 551.573(672)

*Rodier, J. (*Service des Études d'Outre-Mer d'E.D.F.*), and Touchebeuf de Lussigny, P., **Étude de l'évaporation sur les surfaces d'eau libres en Afrique Noire Française.** [Study of evaporation from free water surfaces in French Equatorial Africa.] *Annuaire Hydrologique de la France d'Outre-Mer*, Paris, 1952:11–28. pub. **1954.** figs., 3 tables. **DWB**—A substantial treatise on evaporation in tropical regions, based on data from Félou (Senegal), Kénie (on Niger in Sudan), Fomi and Kindia (Guinea) and occasional data from other places in N. Cameroons, Tchad, etc. Hourly variations in temperature, humidity and evaporation are shown in graphs and tables. Stations are shown on chart of W. Central Africa (a number of other evaporation stations are located on map). Types of measuring equipment are described and monthly values of evaporation and of coefficients of evaporation K, Kr and Kp tabulated for above stations. Comparison is made between amounts calculated from Dalton's law and from Piche evaporimeter. (*Same item as* 7.7–191, July 1956, *MAB.*) *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation instruments 3. French Equatorial Africa.**—*M.R.*

10K–51 551.573(437)

Šermer, Artur, **Výskum výparu z vol'nej vodnej hladiny pre zistenie strát vody z nádrží a iných vodných plôch.** [Investigation of evaporation from free water surfaces for the purpose of determining water losses from reservoirs and other water areas.] *Vodohospodársky Časopis*, Bratislava, 2(2):93–116, **1954.** 12 figs., map, 12 refs., eqs. **DLC**—Results of evaporation measurements made in Slovakia with a differential evaporation pan designed by J. RÓN are reported. Curves showing correlations between evaporation and other meteorological elements (temperature, wind, humidity) as measured in Bratislava and Hurbanovo are presented. From evaporation values measured at

16 stations and those calculated on the basis of temperature data for 100 additional stations, a map of actual (reduced) evaporation is drawn for Slovakia for April 1–Nov. 15, 1953. (*Same item as* 8.7–259, July 1957, *MAB.*) *Subject Headings:* **1. Evaporation rate 2. Czechoslovakia.**—*G.T.*

10K–52 551.573:551.491

*Veihmeyer, F. J. and Brooks, F. A., **Measurements of cumulative evaporation from bare soil.** *American Geophysical Union, Transactions*, 35(4):601–607, Aug. **1954.** 4 figs., 5 tables, 4 refs. **DWB**—Careful measurements were made of evaporation of soil water during 1921 in California at Davis, Delhi, Mountain View and Whittier. The soil surface was kept free of vegetation and no rain fell for periods of eight to 12 weeks. Analyses of the records indicate that average curve of evaporation loss against time may be useful for situations where more exact data are not available. Other studies of soil in tanks reveal that, after the first week, the evaporation rate from bare soil without a water table is extremely slow. For a period of 1574 days during which rain was excluded the average evaporation rate was 0.00236 in./day. When water tables were maintained at depths between 0.5 and 5.0 ft it was found that the evaporation loss from uncropped soil with high water table was not directly proportional to the depth from the soil surface to the water table. (*Same item as* 6.10–208, Oct. 1955, *MAB.*) *Subject Headings:* **1. Cumulative evaporation 2. Evaporation losses 3. Water table 4. Evaporation from soil.**—*Authors' abstract.*

10K–53 551.573:551.481(667

Walker, H. O., **Preliminary report on estimated losses by evaporation from the surface of Lake Volta.** Accra, Gold Coast Meteorological Service, Nov. **1954.** 11 p. table. Mimeo. **GB-MO**—A preliminary examination was made of theoretical methods of estimating evaporation (energy budget and mass transfer) and practical approaches. Computed evaporation over the proposed lake is: PENMAN'S method 69 inches a year; KHOSLA, 62; MEYER, 64. Experiments with evaporimeters and collection of basic meteorological data is proceeding. (*Same item as* 6.7–250, July 1955 *MAB.*) *Subject Headings:* **1. Evaporation from lakes 2. Lake Volta, Gold Coast.**—*C.E.P.B.*

10K–54 551.573:551.577.21:551.464(26

*Wüst, G., **Gesetzmässige Wechselbeziehungen zwischen Ozean und Atmosphäre in der zonalen Verteilung von Oberflächensalzgehalt, Verdunstung und Niederschlag.** [Systematic interaction between ocean and atmosphere in the zonal distribution of surface salinity, evaporation and rainfall.. *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 7:305–328, **1954.** 5 figs., 4 tables 38 refs. German, English and French summaries p. 305–306. **DWB**—New values of precipitation N, evaporation V and salinity S are constructed for 5° zones of oceans. V-N is negative N of 40°N S of 40°S and in 10°N to 0°. Excluding marginal and polar seas there is close parallelism between S and V-N, enabling V to be calculated by:

N. Hemisphere $V = 66.7(S - 34.47) + N \pm 7$ cm.
S. Hemisphere $V = 80.0(S - 34.92) + N \pm 8$ cm.

For world oceans S is given by $S = 34.69 + 0.137(V - N)$. (*Same item as* 5.11–140, Nov. 195 *MAB.*) *Subject Headings:* **1. Evaporation from oceans 2. Precipitation 3. Salinity.**—*C.E.P.B.*

1955

10K–55 551.573:551.481(794

Blaney, Harry F., **Evaporation from and stabilization of Salton Sea water surface.** *American Geophysical Union, Transactions*, 36(4):633–640, Aug. **1955.** 2 figs., 7 tables, numerous refs. Also Rohwer, Carl; Cochrane, N. J. and Blaney, H. F., **Discussion. . . .** *Ibid.*, 37(6):786–788, Dec. **1956.** 2 tables, 5 refs., eqs. **DWB**—Since 1935 the water level in Salton Sea has been rising. Three evaporation stations bordering the sea were established to study the problem. An analysis of pan evaporation, gage heights and inflow measurements indicates that the annual evaporation from Salton Sea ranges from about 70 to 76 inches.—According to ROHWER the Salton Sea is rising faster than it should (according to water budget calculations). This is explained on the basis of slight inaccuracies in estimation of both inflow and evaporation. The factor for comparing pan evaporation varies by nearly 30%, depending on which factor is used. COCHRANE estimates average evaporation from Salton Sea as 62″ per annum. (For fuller abstracts, *see* 7.3–221 and 9.3–21 March 1956 and March 1958, *MAB.*) *Subject Headings:* **1. Evaporation from lakes 2. Lake level variations 3. Salton Sea, Calif.**—*Authors' abstract and M.R.*

10K–56 551.573:551.551:551.5

*†Cermak, J. E. and Lin, P. N., **Vapor transfer by forced convection from a smooth, plane boundary.** Colorado Agricultural and Mechanical College. Dept. of Civil Engineering, Contract N9on 82401 (NR063-071/1-19-49), Report, No. 9, Jan. **1955.** 83+43 p. 37 figs., 30 tables, 31 refs., eqs. **DWB**—Important literature on experimental and theoretical studies of evaporation from

plane surface is reviewed in Ch. 2 (p. 7–16); theory for a fully developed boundary layer giving total rate of evaporation and temperature profile in Ch. 3; description of equipment and observation techniques (wind tunnels, evaporation pans, plate measurements, relative humidity, evaporation and pressure measurements), Ch. 4; and an analysis of data (von Kármán constant, shear velocity and evaporation in turbulent transitional boundary layer) in Ch. 5. The following conclusions are drawn: 1) the evaporation parameter N is uniquely determined by R* (Reynolds number), regardless of type of boundary layer regime; 2) SUTTON's theory modified by PASQUILL gives a sound basis for mass and heat transfer studies by forced convection; 3) when R^* is $<10^3$ the effect of lateral diffusion is not appreciable, etc. (*Same item as* 8.1–261, Jan. 1957, *MAB.*) *Subject Headings:* **1. Vapor transfer from boundary layers 2. Evaporation from plane surfaces 3. Turbulent exchange.**—*M.R.*

10K–57 551.573:551.521.11

Demiańczuk, Piotr Pawel, **Zdolność potencjalna parowania w przedziale wplywu slonca.** [Potential evaporation during the time of sunshine.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby,* 3(4):303–315, **1954.** 2 figs., 9 tables, 10+ eqs. **Pt. 2,** *Ibid.,* 3(5):391–410, **1955.** 43 tables, numerous eqs. Russian and French summaries p. 314–315 and 410. **DWB**—A highly theoretical paper in which the problems of evaporation from the ground and from open water surfaces are treated and solved on a novel physical basis. The physical principles of the formulas for the determination of potential evaporation (in the different months of the year) under the influence of solar radiation, without consideration of the transpiration of plants, have been set forth in an earlier report of the author (1952). It is pointed out that an accurate numerical presentation of the problem could only be made with the help of observational data of the German network because the Polish meteorological network does not have the required data. In Pt. 2 the author derives formulas of the evaporation value in individual months of the year, taking into account the wind speed. The quantity of evaporated water in mm, is expressed by the following formula: P_r, $m \approx \alpha \cdot B \cdot \beta_r$, m, where α is the exchange coefficient which includes the influence of wind on evaporation; B is the coefficient depending on the mean monthly value of atmospheric pressure and mean monthly air temperature. The values of B are given in tables; β_r, m is the mean atmospheric moisture deficit in the individual months. Calculations of evaporability based on the formula are in good agreement with actual measurements. (*Same item as* 7.3–222 and 9.1–237, March 1956 and Jan. 1958, *MAB.*) *Subject Headings:* **1. Potential evaporation 2. Solar influences 3. Evaporation formulas.**—*A.M.P. and Author's abstract.*

10K–58 551.573:551.481(438)

Demiańczuk, Piotr Pawel, **Sprawdzenie stosowalności wzoru $P = \alpha \cdot B \cdot \beta_1$ do obliczania miesięcznej ilości wyparowanej wody z powierzchni wodnej, na materiale pomiarowym z jezior Grimnitz i Werbellin.** [Verification of the application of the formula $P = \alpha \cdot B \cdot \beta_1$ for the calculation of monthly evaporation from the surface of water on the basis of data for Grimnitz and Werbellin Lakes.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby,* 5(1):17–24, **1955.** 8 tables, 6 refs., eqs. Russian and French summaries p. 24. **DLC**—In applying his formula $P = \alpha \cdot B \cdot B_1$ to the monthly quantity of water in mm evaporated from the water surface, the author calculates the volume of evaporation in individual months of the year for the two lakes. The results are found to be in good agreement with evaporation values obtained by direct measurements. (*Same item as* 8.9–245, Sept. 1957, *MAB.*) *Subject Headings:* **1. Evaporation calculations 2. Evaporation from lakes 3. Poland.**—*A.M.P.*

10K–59 551.573:536.423 536.421

Garmendia Iraundegui, José (*Salamanca Univ.*), **La evaporación y la sublimación como procesos irreversibles.** [Evaporation and sublimation as irreversible processes.] *Revista de Geofisica,* Madrid, 14(55):219–227, July/Sept. **1955.** fig., 2 refs., 7 eqs. English summary p. 219. **DWB, DLC**—Following L. ONSAGER'S concepts, the author reviews the thermodynamic processes taking place under solid, liquid and gas phase during evaporation and sublimation. The conclusions are: 1) the temperature difference between the liquid and gas phase is not enough for production of evaporation or condensation; 2) to have evaporation or condensation, the vapor pressure of the gas phase must be lower than the maximum vapor pressure at the liquid phase; 3) the vapor transport per unit time from the liquid to the gas phase is proportional to the difference of the log of the vapor pressure of the liquid and gas phase; 4) if the temperature of the liquid phase is lower than the temperature of the gas phase, then evaporation or condensation will occur without any energy transfer from one phase to another. (*Same item as* 8.9–247, Sept. 1957, *MAB.*) *Subject Headings:* **1. Thermodynamics of irreversible processes 2. Evaporation and sublimation.**—*M.R.*

10K–60 551.506.3:551.573(437)

Kacvinský, Martin, **Výparnosť vody v Podunajskej nížine.** [Evaporation in the Danubian lowland of Slovakia.] *Vodohospodársky Časopis,* Bratislava, 3(3/4):167–183, **1955.** 2 figs., 6 tables,

7 refs., eqs. Russian and German summaries p. 182–183. **DLC**—Monthly evaporation data (mean, maximum, minimum, upper and lower decile and quartile, deviations, variance, frequency, etc.) are tabulated for Hurbanovo (1901–1950). Average evaporation values are also presented as functions of temperature, relative humidity and wind speed. A comparison with evaporation data for Bratislava (1933–42) and Komarno (1933–38) shows highest values in Bratislava (good ventilation and low relative humidity) and lowest in Hurbanovo. The Wild evaporimeter is found to yield accurate results in addition to being easy to handle. (*Same item as* 8.7–256, July 1957, *MAB.*) *Subject Headings:* **1. Evaporation data 2. Czechoslovakia.**—*G.T.*

10K–61 551.573:551.481

Kohler, M. A.; Nordenson, T. J. and Fox, W. E., **Evaporation from pans and lakes.** *U. S. Weather Bureau, Research Paper*, No. 38, May **1955.** 21 p. 7 figs., 6 tables, 18 refs., 17 eqs. **DWB**—The empirical relationships for converting pan evaporation to lake evaporation which were used in the past (0.7 pan coefficient) give erroneous results unless advected energy and heat transfer through the pan are considered. Comparison of Lake Heffner relations with data from 8 other places in the U. S. show excessive bias (8 or 9%) in the deep South. An improved set of nomograms leads to reduced error. Annual lake or reservoir evaporation is treated in Pt. 2 of this monograph. Computation, all parameters of stations, and calculated water budget and lake evaporation in inches are tabulated according to a number of methods. (*Same item as* 7.1–23, Jan. 1956, *MAB.*) *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation formulas 3. Lake Heffner, Okla.**—*M.R.*

10K–62 551.573:551.481(942)

Royal Geographical Society of Australasia. South Australian Branch. Lake Eyre Committee. **Lake Eyre, South Australia: the great flooding of 1949–50. Report of the Lake Eyre Committee.** Adelaide, South Australia, Griffin Press, **1955.** 75 p. tables, plates, refs., figs., throughout, map (fold.) at end. **GB-MO.**—Includes: Bonython, C. Warren, **Evaporation rate,** p. 37–56, Penman, H. L., **Evaporation from Lake Eyre,** p. 57–61. Bonython made detailed meteorological observations on the lake in May and Sept. 1951 and calculated evaporation rate in 1951 as 76.8″ (Dec. 11.7 June 1.2); somewhat higher values are given by Penman. (*Same item as* 7.4–4, April 1956, *MAB.*) *Subject Headings:* **1. Lake level fluctuations 2. Evaporation from lakes 3. Lake Eyre, Australia.**—*C.E.P.B.*

10K–63 551.573:551.48(43)

*Schmuck, Adam, **Parowanie z wolnej powierzchni wodnej w Polsce.** [Evaporation from free water surface in Poland.] *Wrocławskie Towarzystwo Naukowe, Sprawozdania*, 8(1), **1955.** 19 p. 10 figs., tables, 11 refs. **DWB, DLC**—Evaporation from free water surface is a continuous process of great importance for water economy, navigation, hydroelectric plants, water reservoirs, canals, sluices, fish ponds, etc. The author presents the results of his study of such evaporation in Poland for 1948–1952. The calculation is based on the empirical formula of potential evaporation $Er = 30\,d$ where Er is the annual amount of evaporation in mm, and dr is the annual amount of mean monthly moisture deficit. This coefficient was accepted as a mean on the basis of 102 comparative estimations of evaporation made simultaneously with the aid of Wild evaporimeters in an open spot exposed to the action of sun and winds on the bank of the Oder River and in a quiet place near the observatory. It was calculated for 0 m height. The results of calculations of moisture deficit made on the basis of data for 41 stations are presented on maps showing the distribution of mean annual, cold and warm season isothymes (lines of equal evaporation) and a comparison of their distribution in a dry and a rainy year, half year and month (1951 was dry; 1952, rainy). The mean monthly, seasonal, annual and annual amounts of evaporation (with their maximum and minimum values in any data of the whole period and their amplitude for 41 stations) are presented in a table and discussed. They do not reveal any synchronous tendencies of the whole territory of Poland; on the contrary, some regions show an increase of evaporation at the time when others show a decrease. (*Same item* 8.1–266, Jan. 1957, *MAB.*) *Subject Headings:* **1. Evaporation from water surfaces 2. Water conservation 3. Evaporation data 4. Poland.**—*A.M.P.*

10K–64 551.573:551.579

Stanhill, G. (*Natl. Vegetable Res. Sta., Wellesbourne*), **Evaporation of water from soil under field conditions.** *Nature*, London, 176(4471):83, July 9, **1955.** 2 figs., 5 refs. **DWB**—Comparison of evaporation from soil and water under identical conditions showed two stages. In the first soil loss equalled water loss; in the second, it became progressively less. This was due to limitation of capillary movement, which depends on soil structure. Progress of drying in a seed bed was followed to a depth of 3 in. (*Same item as* 6.9–236, Sept. 1955, *MAB.*) *Subject Heading:* **1. Evaporation from soil.**—*C.E.P.B.*

10K–65 551.573:551.481(788)

Streiff, Abraham, **Compressed air vs. drought.** *Compressed Air Magazine*, N. Y., p. 232–235, ug. **1955.** photos, graphs. **DWB.** Also issued in *The Reclamation Era*, Wash., D. C., 43(3):61–4, 74, Aug. **1957. DWB**—Surface waters of Lake Mead on the lower Colorado are 10° to 26° armer than at 150 ft depth. If compressed air, such as is used to prevent freezing of surface waters ponds and dams in the North, could be used to bring up cool water from the depths of Lake Mead, vaporation could be reduced appreciably. A t55° average loss is .057″/day, at 67°=.276″/day nd at 80°=.415″/day. Total loss per year is 100 in., or one million acre feet per year or 25 times ie entire amount of water to be impounded behind the new 912 ft Grand Dixence Dam in Switzer- nd. Caspian Sea is losing water faster than it is gaining. (*Same item as* 8.9–249, Sept. 1957, *MAB.*) *Subject Headings:* **1. Evaporation from lakes 2. Evaporation from reservoirs 3. Evapora- on control 4. Lake Mead, Colo.**—*M.R.*

1956

10K–66 551.573:551.579.5

Abramova, M. M.; Bol'shakov, A. F.; Oreshkina, N. S. and Rode, A. A., **Isparenie iz pochvy dveshennoĭ vlagi.** [Evaporation of suspended water from the soil.] *Pochvovedenie*, Moscow, o. 2:27–41, **1956.** 9 figs., table, 9 refs. French summary p. 4 of its Transl. Suppl. **DLC.** Transl. ito English available Special Libraries Association Translation Center (John Crerar Library, hicago) as its R-3908.—An extensive study was made of the evaporation of water suspended in the il, both under laboratory and field conditions. The behavior of this water in different types of ils was examined. It is shown that the retention of suspended water in the soil is a function of its echanical composition and structure of the soil and its movement through the soil during evapora- on varies with the soil characteristics. A detailed analysis, illustrated graphically, is given of the vaporation of moisture from different soil types. (*Same item as* 10.3–276, March 1959, *MAB.*) *ubject Headings:* **1. Evaporation from soil 2. Soil types.**—*I.L.D.*

10K–67 551.501.4:551.573(57/8)

Afanas'ev, A. N., **K voprosu rascheta velichiny ispareniia s vodnoĭ poverkhnosti vodoemov, akhodiashchikhsia v fisikogeograficheskikh usloviiakh Sredne-Sibirskoĭ vozvyshennosti.** [The roblem of calculating the magnitude of evaporation from the water surface of reservoirs under the ıysiographic conditions of the central Siberian plateau.] *Meteorologiia i Gidrologiia*, No. 10:39–41, ct. **1956.** fig., 2 tables, 2 refs. **DWB, DLC**—The various formulas of B. D. ZAĬKOV, and A. P. RASILAVSKIĬ and Z. A. VIKULINA for computing evaporation from water surfaces of reservoirs are sted on the basis of actual data obtained on an evaporation area near the Angara River. Observa- ons show that calculations by ZAĬKOV's formula vary by only 2% from actual measurements. he influence of water basins upon evaporation from an experimental area is discussed. (*Same em as* 10.3–118, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation calculations 2. Evapora- on from reservoirs 3. Central Siberian plateau.**—*I.L.D.*

10K–68 551.573:551.551:551.571

†Albertson, Maurice L., **La mécanique de l'évaporation, Pt. 1.** [Mechanics of evaporation, t. 1.] *La Houille Blanche*, Grenoble, 10(5):704–717, Oct./Nov. **1955. Pt. 2,** *Ibid.*, 11(1):36–52, an./Feb. **1956. Pt. 3,** *Ibid.*, 11(2):282–311, May/June **1956.** 19 figs., 34 refs., 113 eqs. (in 3 ticles). All articles in French and English. **DLC.** Thesis, Grenoble Univ., Faculty of Sciences.— major contribution in the form of a thesis prepared by the author at Grenoble (while on an ex- hange scholarship), but based on experimental work done since 1945 at Iowa Inst. of Hydraulic esearch, at the Climatic Research Lab. at Colorado A. & M. and a model study of the Lake Hefner tup, also made at Colorado A. & M. The physical theory, history of theoretical and empirical ork on evaporation from land and ocean, modern concepts of turbulent boundary layers, free and rced convection as developed by REYNOLDS, TAYLOR, VON KÁRMÁN, PRANDTL and others, the boratory experiments mentioned above (in great detail) and the results of the experiments are eated systematically. It is shown how heat transfer is intimately related to vapor transfer. *Same item as* 8.10–207, Oct. 1957, *MAB.*) *Subject Headings:* **1. Evaporation theory 2. Turbulent ansfer of moisture.**—*M.R.*

10K–69 551.573:551.48

Cochrane, N. J., **Evaporation from lakes and reservoirs.** *Water Power*, London, p. 192–193, ay **1956.** (Abstracted from reprint.) **DLC**—Proposed expression:

$$E_c = \frac{T^2}{100}\sqrt{\frac{U+3'}{20\,H_r}}\left(\frac{60}{H_r T}\right)0.8$$

=open water evaporation [inch]; T=temperature [F]; U=wind speed [MPH] 10 m above

water; H_r=relative humidity. All values are annual means or totals. Favorable agreement wit water budget data for a number of lakes was obtained. (*Same item as* 9.11–228, Nov. 1958, *MAB* *Subject Heading:* **1. Evaporation from water surfaces.**—*A.A.*

10K–70 551.501:551.573:551.48(438

Demiańczuk, Piotr Pawel, **Parowanie z wolnej powierzchni wody.** [Evaporation from a fre water surface.] *Acta Geophysica Polonica*, Warsaw, 4(3):145–200, **1956.** 52 tables, 7 refs., 46 eq Russian summary, p. 195–199; French summary p. 200. **DWB, DLC**—In view of the fact tha results of measurements of evaporation from various Polish lakes carried out earlier by the Stat Hydrographic Institute in Poland were partly destroyed during the 2nd World War, the autho presents a theoretical method for solving the problem of evaporation from Polish lakes and basin He introduces formulas with the aid of which it is possible to calculate the monthly quantity evaporated water. The values thus calculated are in agreement with values obtained through dire measurements. In conclusion a method is presented for calculating mean monthly values of a mospheric moisture deficit. *Subject Headings:* **1. Evaporation calculation theories 2. Evaporatio from lakes 3. Poland.**—*A.M.P.*

10K–71 551.573:628.13(497.

Filipov, G., **Zagubi ot izparenie vŭv vodkhranilishtata.** [Losses by evaporation from wat reservoirs.] *Khidrologiia i Meteorologiia*, Sofia, No. 2:55–65, **1956.** 3 figs., table, 3 refs. Engli and Russian summaries p. 64–65. **DLC**—Methods of computing evaporation from reservoirs on t basis of meteorological factors are reviewed. In Bulgaria the basic data necessary for such co putation are largely lacking. Some work has been done on the use of floating evaporimeters. Co parative data are presented on monthly evaporation values obtained by floating and by land eva orimeters (Vassil Kolarov reservoir, June–Sept., 1954 and 1955). Readings of the floating i struments are consistently higher than those of the land evaporimeter; the difference shows a stea increase from June to Sept. *Subject Headings:* **1. Evaporation from reservoirs 2. Bulgaria.**—*G.*

10K–72 551.573:53

Garmendia Iraundegui, José, **La termomecanica de la evaporación y de la sublimaci** [Thermodynamics of evaporation and sublimation.] *Revista de Geofísica*, Madrid, 15(57):29–3 Jan./March **1956.** 4 refs., 6 eqs. Spanish and English summaries p. 29. **DWB**—A theoreti development of the thermodynamics of evaporation and condensation leading to the conclusi that 1) when the gas and liquid phase are not in thermal equilibrium, the difference between the f enthalpy per unit mass does not determine the evaporation and sublimation processes; 2) the va tion of vapor pressure between the two phases affects the evaporation or sublimation; 3) equilibri is established with respect to evaporation or sublimation, when the vapor pressure equals that saturation at the liquid phase; 4) the difference of the logarithms of the vapor pressures determi the tendency of the evaporation. (*Same item as* 9.4–175, April 1958, *MAB.*) *Subject Headin* **1. Thermodynamics of evaporation 2. Evaporation and sublimation.**—*M.R.*

10K–73 551.551:551.573:533.6

Hay, J. S., **Evaporation from a saturated rough surface into a turbulent air stream.** *Port England. Chemical Defense Experimental Establishment, Porton Technical Paper*, No. 533, 19 13 p. 5 figs., 4 tables, 14 refs., eqs. Mimeo. **DWB**—Evaporation from rough and smooth s urated plaster surfaces was measured in a wind tunnel, together with vertical distribution of w speed and vapor content in the lowest few cm. Evaporation increased almost linearly with w speed 1–9 m/s but over the smooth surface it was only about half that above a rough surface of same basal area. Results are discussed in terms of analogy between momentum and mass trans (*Same item as* 7.11–216, Nov. 1956, *MAB.*) *Subject Headings:* **1. Evaporation research.**—*C.E.P.*

10K–74 551.573:551.578.46(584

Idzon, P. F., **Isparenie s poverkhnosti snega po nabliudeniiam v Dzhanybeke.** [Evaporat from snow surface according to observations in Dzhanybek.] *Meteorologiia i Gidrologiia*, Leningr No. 2:24–26, Feb. **1956.** fig., table, 3 refs. **DWB, DLC**—The author analyzes observations on evaporation of snow made in 1952 at Dzhanybek in the Caspian depression. Data on daily ev oration are given in a table and graph; the maximum evaporation obtained was 0.82 mm over 12 The relationships between evaporation of snow and atmospheric temperature and humidity total snow evaporation over extended periods are discussed. (*Same item as* 8.9–248, Sept. 1 *MAB.*) *Subject Headings:* **1. Evaporation from snow 2. Dzhanybek, Kazakh S.S.R.**—*I.L.D.*

10K–75 551.579.2:551

Kharchenko, S. I., **Issledovanie poter' i dobeganiia talykh vod.** [Investigation on the lo of melt water and its runoff time.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Tr*

7(111):5–53, 1956. 17 figs., 12+6 tables, 29 refs., 10 eqs. **DWB**—Characteristics of snow cover, now melt, soil moisture, soil freezing, etc. for 1949–1954 in the Sal Basin (based on data at the Dubovka Hydrologic Experiment Station) are analyzed graphically and statistically to allow formulaon of spring flood hydrographs. Losses due to infiltration and evaporation of snow were also tudied during 1952–55, inclusive. Evaporative losses amounted to about 4–8 mm; 5 mm in 1954 uring period of snow melt, whereas infiltration losses were 50–90 mm (1954). Infiltration losses epend on moisture deficit and whether sub-strata are frozen. When the underlying soil is frozen, nfiltration is almost negligible. Accumulation of melt water is seldom over 6 mm when moisture ontent is high. If moisture is deficient almost all the snow melt is lost by infiltration. Mean elocity of runoff of snow melt on slopes varies from 1 to 50 mm/sec at the beginning of thawing and in aturated snow cover, respectively, when there is ample moisture available; and from 50–200 mm/sec n extreme cases 500 mm/sec) when channels are well developed. Velocities of intrasnow and hannel runoff can be calculated from empirical formulas and nomograms and used in developing ood hydrographs. *Subject Headings:* **1. Snow melt hydrographs 2. Evaporation losses during now melt 3. Spring flood hydrograph calculation 4. Dubovka Hydrologic Experiment Station . Infiltration losses in snow melt 6. Snow melt runoff velocities 7. Dubovka, Rostov Oblast, .S.S.R.**—*M.R.*

10K–76 551.573:628.13

Kirillova, T. V.; Ogneva, T. A and Timofeev, M. P., **Isparenie s poverkhnosti ogranichennykh odoemov.** [Evaporation from the surface of bounded reservoirs.] *Leningrad. Glavnaia Geoicheskaia Observatoriia, Trudy*, 59(121):40–44, **1956.** 2 tables, 3 eqs. **DWB, DLC**—In the case given values of p (index characterizing the variation of wind velocity with height), k_1/u_1 (ratio the coefficient of turbulence to wind velocity at height z), values of atmospheric moisture e' and aximum vapor tension for surface temperature, e_s in mb and wind velocity in met/sec the rate of vaporation is given by $E=0.16\,u_1\dfrac{e_s-e'}{x^{0.1}}\left(\dfrac{\text{mm}}{\text{sec}}\right)$. In order to compute the surface temperature of reservoir in the absence of such data the equation of evaporation E for time t is

$$E_t=a_1u_1\left\{D+n\left[e^{-Qt}\left[(T_S-T')-\frac{\bar{P}}{Q}\,(e^{Qt}-1)\right]\right]\right\}$$

here D=atmospheric moisture deficit; $a_1=\dfrac{9.8\left(\dfrac{k_1}{u_1}\right)^{1-p}}{x^p}$; $n=\dfrac{24.10^3}{(235+T')^2}\,e^{(17.1T'/235+T')}$; T'=temerature of advected air; $Q=\dfrac{1}{\alpha}\,[b+60a_1u_1n+4\sigma T_0^3]$ in case of $b=\dfrac{375\left(\dfrac{k_1}{u_1}\right)^{1-p}}{x^p}-u_1$; σ=Stefanoltzmann constant; T_0=mean absolute temperature; $P=\dfrac{1}{\alpha}\left[B_b+\alpha\dfrac{dT'}{dt}-R'-S'(A'-A)+60a_1u_1D\right]$ here B_b=heat exchange with bottom, R'=radiation balance on land, S'=incoming shortwave adiation, A and A'=albedo of water surface and of land, respectively, $\alpha=c\delta\int_0^H\varphi\left(\dfrac{Z}{H}\right)dz$=heat xchange in water as a function of depth and heat characteristic of water $c\delta$. A table giving assumits of parameters determining evaporation and computed evaporation values is presented. The ata indicate that mean daily evaporation rate is influenced by atmospheric temperature and moisre deficit, wind velocity, dimensions of the reservoir, radiation balance and characteristic of temerature diffusion. Also a table giving the results of calculations from real water surfaces (Tsimansk reservoir and Lake Krasavista) where all the variables vary simultaneously, is presented. eal values of evaporation obtained demonstrate the validity of the method described. *Subject eading:* **1. Evaporation from reservoirs.**—*I.L.D.*

10K–77 551.508.72:551.501.4

Kiuchukova, M., **Vŭrkhu opredeliane prevodnite koefitsienti na bregovi izpariteli GGI-3,000.** Determining the reduction coefficient of the GGI-3000 shore evaporimeters.] *Khidrologiia i eteorologiia*, Sofia, No. 1:26–31, **1956.** 4 tables, 6 refs., 6 eqs. **DLC**—The problem of reducing adings of the GGI-3000 land evaporimeters (surface 3000 cm², depth 60 cm) to values of evaporaon from an open water surface is discussed. Ratios of GGI-3000/2 m² tank readings are tabulated r Sofia, June–Oct. 1953–1955. On the basis of KUZNETSOV'S formula (1954) average reduction efficients are calculated for 6 stations in Bulgaria. *Subject Headings:* **1. Evaporimeter reduction efficients 2. Bulgaria.**—*G.T.*

10K–78 551.573:551.551:551.57

†Konstantinov, A. R., **Obosnovanie metodiki rascheta isparenиia po dannym meteorologicheskik stantsiĭ.** [Bases of a method for calculating evaporation from data of meteorological stations. *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 54:5–74, **1956.** 28 figs. (som fold.), 24 tables, 43 refs., 67 eqs. **DLC, DWB**—The author adapts the method of calculating evap oration from gradient measurements to observations made in a network of weather stations. Th characterization of the state of the layer near the ground by means of the values of meteorologic elements at two elevations is replaced by a characterization by meteorological elements at one eleva tion and by auxiliary data, such as roughness of the underlying surface and empirical relationshi between meteorological elements provided by the weather stations. The method of computin evaporation and turbulent exchange from weather station data is based upon the method of calcula ing turbulent currents in the atmosphere from gradient measurements (*Trudy GGI*, No. 48 (10 **1955**) and it has been shown that the increase of turbulent flow in the atmosphere increases with risin instability of temperature stratification because of the selectiveness of turbulent exchange whe warmer air masses move upward and colder downward rather than air masses with mean temperatu at a given level. The contents of this comprehensive paper include the following, viz: equations f computing heat flow, evaporation, and coefficients of turbulent exchange on the basis of measuremen at two levels, analysis of the temperature and humidity profiles of the atmosphere near homogeneo underlying surfaces, profiles of homogeneous elements over a water surface, a snow surface and ov a soil surface; the concept of the height of the displacement of air, temperature and humidity of grass surface; formulae for computing coefficients of exchange, evaporation and turbulent heat e changes of homogeneous underlying surfaces with the atmosphere, determination of atmospher moisture gradient from weather station data; and examples illustrating the calculation of evaporatio from standard observations at weather stations. Extensive data are presented in tables and graph *Subject Headings:* **1. Evaporation calculation 2. Turbulent exchange theory.**—*I.L.D.*

10K–79 551.556:551.573:551.57

Kotsev, V. and Florov, R., **Vŭrkhu toplinniia balans na pochvata i izparenneto ot pochv** [Thermal balance of the soil and evaporation from the soil.] *Khidrologiia i Meteorologiia*, Sof No. 1:32–43, **1956.** 6 figs., 9 tables, 19 refs. **DLC**—An experimental arrangement is described which two pairs of loam and sand blocks (40/40/11 cm) in wooden boxes were placed in the ope wind speed was modified artificially (fans) for one of the pairs and so was moisture supply. S moisture and temperature at various depths, and wind speed were measured and various componen of the thermal balance of the soil were determined. Values of thermal components are tabulat for various wind, radiation and moisture conditions. Heat used for evaporation from a 5 cm colu of 1 cm² section is 0.7 cal/min for wet sand at a wind speed of 10 m/sec, and 0.39 cal/min at a wi speed of 3.3 m/sec. For wet loam the values are 0.987 and 0.366 cal./min, respectively. *Subj Headings:* **1. Evaporation from soil 2. Wind effects on evaporation 3. Soil moisture effects evaporation 4. Thermal balance of soil.**—*G.T.*

10K–80 551.573:551.48(4

Kuznetsov, V. I., **Isparenie s vodnoĭ poverkhnosti v raĭone Sal'skikh stepeĭ.** [Evaporati from the water surface in the region of the Sal steppes.] *Leningrad. Gosudarstvennyĭ Gid logicheskiĭ Institut, Trudy*, 57(111):86–92, **1956.** 3 figs., 4 tables, 2 refs. **DWB**—The amount evaporation from a water surface in the Sal steppes is established. Investigations were carried out means of a GGI-3000 evaporimeter. A reduction coefficient with an average magnitude of 0 was used to make evaporimeter readings comparable with those of the water surfaces in tan Results of the investigations show that evaporation is fairly stable at all stations. The aver monthly values for the entire region were determined for the period May–Oct. A chart showing location of stations, tabular data, a curve of total evaporation, and deviations of individual evapo tion amounts from the total for May–Oct. are presented. *Subject Headings:* **1. Evaporation fr water surfaces 2. Evaporimeter reduction coefficients 3. Sal Steppes.**—*Ref. Zhur, Geofizika*, 84 1957.

10K–81 551.501.4:551.573(4

Laĭkhtman, D. L. and Timofeev, M. P., **O metodike rascheta isparenиia s poverkhnosti ogra chennykh vodoemov.** [Method of calculating evaporation from the surface of bounded bodies water.] *Meteorologiia i Gidrologiia*, No. 4:19–23, April **1956.** fig., table, 6 refs., 14 eqs. **DW DLC**—A bounded surface of water is considered to be of the order of magnitude 0–100 km²; ev oration from such a body varies with distance from the periphery and is not complicated by d densation. A formula for calculating evaporation from a bounded water surface is developed:

$$E = E_0 + be^{-mt}\left[(T_n - T')_0 + \int_0^t ne^{mu}\,dy\right],$$

here

$$E_0 = \frac{0.15u_2D}{x^{0.1}}; \qquad b = \frac{0.15u_2d(T')}{x^{0.1}}$$

graph showing the annual variation of evaporation from the Tsimlyansk reservoir is presented. *Same item as* 9.3–143, March 1958, *MAB.*) *Subject Headings:* **1. Evaporation calculations 2. Evaporation from reservoirs 3. Tsimlyansk, U.S.S.R.**—*I.L.D.*

10K–82 551.573

Mansfield, W. W. (*Div. of Industrial Chemistry, C.S.I.R.O., Melbourne*), **Use of hexadecanol for reservoir evaporation control.** (1956?) p. 13–42 of unidentified **Proceedings (Southwest Research Institute?).** 11 figs., 14 refs. **DWB** (M73 M287us)—The author discusses the use of hexadecanol for reservoir evaporation control, the factors of solar radiation, wind velocity, air temperature and atmospheric relative humidity, and the rate and direction of heat transfer from a water surface. The progress of evaporation control is promising but the author considers present investigations experimental. Many questions, answers and explanations are offered under "Discussion." *Subject Headings:* **1. Evaporation control 2. Cetyl alcohol. I. Southwest Research Institute, San Antonio, Texas.**—*N.N.*

10K–83 551.573:551.582.2(789)

*New Mexico. State Engineer Office, **Climatological summary of New Mexico: temperature, 1850–1954; frost, 1850–1954; evaporation, 1912–1954.** Its *Technical Report*, No. 5, **1956.** 277 p. figs., graphs, numerous tables. **DWB**—Mean monthly temperatures and pan evaporation are shown on bar charts; a graphical index shows years when temperature, precipitation and evaporation records were available for scores of stations in the state of New Mexico. Finally, the main body of the report (p. 70 277) consists of the actual monthly and annual data, from the beginning of record (e.g. 1874–1954 for Santa Fe) for mean temperature, frost dates, and evaporation, arranged by counties. Evaporation data are included for 3 stations in Arizona, 6 in Colorado, and 6 in Texas. *Same item as* 8.10–260, Oct. 1957, *MAB.*) *Subject Headings:* **1. Climatic data for New Mexico 2. Evaporation data 3. New Mexico. I. U. S. Weather Bureau II. New Mexico. Interstate Stream Commission.**—*M.R.*

10K–84 551.573:551.551:628.13

*Ogneva, T. A., **Sutochnaia izmenchivost' isparenia i turbulentnogo teploobmena s vozdukhom nad morem.** [Daily variability of evaporation and of the turbulent heat exchange with the air of reservoirs.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 59(121):45–52, **1956.** fig., tables, 3 refs., 2 eqs. **DWB, DLC**—The evaporation rate from a water surface is determined by the equation $E' = \frac{k_1\rho}{Z_1} \frac{q_0 - q_3}{\ln \frac{k_1\left(\frac{Z_3}{Z_1}\right)}{D}}$ where q_0 and q_3 = moisture at the surface and height Z_3 in air, D = coefficient of molecular diffusion (an analogous expression can be written for P = heat flow). The initial data for computing heat loss by evaporation and turbulent exchange and computed results on the basis of observations of 7 days over water and land, relationship of heat loss by evaporation to turbulent exchange over water and land, relationship of the components of heat balance over water and land, etc., are presented in tables. Analysis of the results leads to the following conclusions: during summer the radiational heat over water is lost during the day by evaporation from the surface. In the course of a day evaporation varies slightly but at night when negative temperatures prevail, the radiational balance is provided at the expense of the heat of the water surface. The turbulent heat exchange increases in summer by about 10% the radiational advection of heat to the water surface. In spring the relationship of the heat balance components is substantially different. The mean daily loss of heat by evaporation is 20% less if the incoming radiational heat and all the remaining heat is accumulated in the water mass. *Subject Headings:* **1. Evaporation from reservoirs 2. Turbulent exchange over reservoirs.**—*I.L.D.*

10K–85 551.573:551.578.46

Shchemelevas, V. M., **Ob isparenii snega v predvesennii period v raĭone goroda Vil'nius.** [Snow evaporation in early spring in the region of Vilnyus.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai, Vol. 3, Geofizika, Hidrologija*, issued Vilnyus, **1956.** p. 75–77, table, eq. **DLC**—During Feb. and Mar. 1953, evaporation measurements from a grounded surface were carried out by the gravimetric method. The results indicate considerable and characteristic evaporation of snow under natural conditions differing from evaporation from a water surface. Evaporation on bright days ranged from 0.4 mm to 0.8 mm/day (10 hours), i.e., from 400–

800 g/m². Maximum evaporation was observed in connection with intense turbulence and super adiabatic gradients at the earth's surface. Maximum evaporation of 1.4 mm occurred at air temperatures of −4° to −7°C at a height of 10 cm. Evaporation of snow in rooms with temperature of 15°–17°C but with practically no turbulence was insignificant. Evaporation from snow surface is a function of vertical temperature gradient, wind velocity and moisture deficit; thus $Q \sim \frac{\partial T}{\partial z} v(E-e)$. At night condensation and sublimation occurred, they were one tenth of the evaporation amount on bright days. Condensation and sublimation occurred by day when the snow surface temperature reached the dew point. This is especially frequent during the melting period when sufficiently high air temperatures (9–10°C) and high humidity (6–8 mm) prevail. Observations on snow surfaces shielded from direct solar radiation showed that evaporation was 60% less. From naturally dirty snow, evaporation is more intense, about 1.3 as much, as a result of higher temperature on the darker surface. *Subject Headings:* **1. Evaporation of snow 2. Vilnyus Lithuania.**—*I.L.D.*

10K–86 551.573:551.582.2(8

Sifontes, Ernesto, **La evaporación en los llanos de Venezuela.** [Evaporation in the plains of Venezuela.] Caracas, Venezuela, Talleres Tipograficos "El Globo," **1956.** 35 p. photos, tables.— This booklet contains three articles: 1) **La evaporación en los llanos de Venezuela; fin del veran en el Valle del Rio Orinoco,** in which data on evaporation, wind velocity, cloudiness, insolation and humidity are presented for the period most critical from the point of view of drought in 1954 (March 20–April 14), 2) **La evaporación en los llanos de Venezuela; estación de las lluvias,** in which evaporation and other data are presented for the rainy season, and 3) **Los vientos de verano; zona de ll llanos Venezolanos,** a general discussion of wind conditions during the dry season and data for D cember 1944–April 1945 (the article is dated 1945). *Subject Headings:* **1. Evaporation data 2. Wi data 3. Climate of Venezuela 4. Venezuela.**—*G.T.*

10K–87 551.524:551.526.6:551.573(261

Strokina, L. A., **Turbulentnyĭ teploobmen s atmosferoĭ i isparenie s poverkhnosti Baltiisko moria.** [Turbulent heat exchange with the atmosphere and evaporation from the surface of t Baltic Sea.] *Meteorologiia i Gidrologiia,* No. 5:56–60, May **1956.** 5 figs., 2 tables, 10 refs., 4 e **DWB, DLC**—The formulas for determining heat loss by evaporation (SHULEĬKIN) and for calculati the turbulent heat exchange of the sea surface and the atmosphere are presented. The results computations of the annual totals of turbulent heat exchange between water and air and annu total of heat loss by evaporation in the Baltic Sea are presented in graphs and in tables. It w found that during warming the radiation balance was the most important constituent of the therm balance and the heat exchange with the deeper layers. During the period of cooling the princi role is played by the transport of heat. The annual variations of the various constituents of h exchange are similar in the sea and in its gulfs. Geographical variations of heat exchange water- and of evaporation are slight during the warm season and more marked during the colder seas (*Same item as* 9.1–85, Jan. 1958, *MAB.*) *Subject Headings:* **1. Turbulent heat exchange 2. H exchange sea-atmosphere 3. Evaporation from seas 4. Baltic Sea.**—*I.L.D.*

10K–88 551.573:725

Uhlig, Siegfried, (*Bad Kissingen*), **Der tägliche Wasserverlust von Speicher- und Schwim becken.** [Daily water losses from storage and swimming pools.] *Wasserwirtschaft,* Stuttg 46(7):180–181, April **1956.** 2 tables, 2 refs. **DLC**—Results of PENMAN'S equation for the evapo tion from free water surfaces give much too low values in the winter, compared with data obtai from the water balance of lakes. The actual daily water losses from swimming pools amount to of their volume on the average, which is 25–40 times the daily evaporation. (*Same item as* 8.11–2 Nov. 1957, *MAB.*) *Subject Headings:* **1. Evaporation from swimming pools 2. Germany.**—*A.*

10K–89 551.573(2

*†Venkateswaran, S. V. (*Physical Res. Lab., Ahmedabad*), **On evaporation from the Indian Oce** *Indian Journal of Meteorology and Geophysics,* 7(3):265–284, July **1956.** 16 figs., 4 tables, 51 re 10 eqs. **DWB**—The main historical contributions to the subject of evaporation and energy exch over the oceans from HALLEY (1686) to SVERDRUP (1951) and others are reviewed in detail interpreted critically with respect to conditions in the trade-wind belt and especially that of Indian Ocean. The sources of data, formulas used (modified Jacobs equation), the determina of the coefficient of evaporation K for the Indian Ocean, annual and seasonal distribution Indian Ocean, annual average of Bowen's ratio R and annual values of energy loss in cal/cm²/day conduction (Qh) over the Indian Ocean (7 charts in all); annual values of total energy loss excess of evaporation over precipitation (6 charts); and latitudinal estimates of E-P for 0–3 are discussed and illustrated. In drawing the seasonal charts of evaporation (E) and of

ACOBS' (1951) charts have been used (modified for low latitudes where an overestimate of evapora-on was made by JACOBS, according to the author). It is concluded that the main mode of energy ansfer in the trade region is in the form of latent heat. The adjustment of theoretical and indirect lculations to direct aerological data is considered at some length. (*Same item as* 8.5–86, May 959, *MAB.*) *Subject Headings:* **1. Evaporation from seas 2. Energy exchange sea-atmosphere Indian Ocean. I. Jacobs, W. C.**—*M.R.*

10K–90 551.573:551.481(676)

Walker, H. O., **Evaporation from Lake Victoria.** *Weather*, 11(12):382–384, Dec. **1956.** photo, tables, 6 refs. **DWB**—Annual evaporation from the lake is discussed from the limited data avail-ble and estimated as 60–65″ (most probable value 62″). The monthly values vary from 10″ Jan. and March to 7″ in May, June and July. (*Same item as* 8.4–258, April 1957, *MAB.*) *Subject eadings:* **1. Evaporation from lakes 2. Lake Victoria, East Africa.**—*C.E.P.B.*

1957

10K–91 551.573:551.481(494)

Blaney, Harry F. (*Soil & Water Conservation Res. Branch, U. S. Dept. of Agric., Los Angeles*), **vaporation study at Silver Lake in the Mojave Desert, California.** *American Geophysical Union, ransactions*, 38(2):209–215, April **1957.** 4 figs., 4 tables, 7 refs. **DWB, DLC**—Silver Lake is cated in the Mojave Desert north of Baker, Calif. It was formed within a period of three days a result of a flood in the Mojave River in March 1938. Previously the lake had been dry for veral yrs. Its maximum size was 7 mi long and 3 mi wide. After this flood, daily observations ere made of temperature, humidity, wind movement, precipitation, and pan evaporation at a lass A Weather Bureau evaporation station established adjacent to the lake, and of changes in ater level and temperatures of the lake from May 1938 to April 1939. This paper presents a mmary of these measurements. No inflow or outflow occurred during the study and the lake was tirely dry at the end of the following year. Borings in the tight clay lake bottom indicated there ere no losses by seepage. The purpose of the study was to determine coefficients for converting n evaporation to lake evaporation and to develop an empirical relation between evaporation and eteorological factors, under desert conditions. The results show that annual evaporation from lver Lake was about 79 in. for the period of observation, and that a coefficient of 0.60 could be ed in reducing Weather Bureau pan evaporation to lake evaporation in desert areas with similar imate. (*Same item as* 8.10–208, Oct. 1957, *MAB.*) *Subject Headings:* **1. Evaporation from esert lakes 2. Evaporation from pans 3. Evaporation coefficient 4. Silver Lake, Calif.**—*Author's stract.*

10K–92 551.573:551.579.5

Budagovskiĭ, A. I., **Zavisimost' ispareniia ot vlazhnosti pochvy.** [Dependence of evaporation soil moisture.] (In: Akademiia Nauk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie bor'ba s nimi.** Moscow, **1957.** p. 189–198. 4 figs., 8 refs., 9 eqs.) **DLC** (QC940.R9A6)—A ghly theoretical paper in which the author attempts to explain the character and essence of the pendence of evaporation on soil moisture. (*Same item as* 10C–13, March 1959, *MAB.*) *Subject eading:* **1. Evaporation-soil moisture relationships.**—*A.M.P.*

10K–93 551.573(64)

Emon, J., **L'évaporation au Maroc.** [Evaporation in Morocco.] *Rabat, Morocco. Institut cientifique Chérifien. Service de Physique du Globe et de Météorologie, Annales*, 17:87–102, **1957.** figs., 4 tables, 15 refs. **DLC**—Study of the evaporation measurements at 16 stations of the Moroc-n synoptic network (period 1949–1953). The author successively considers the geographical ariation of annual totals, the variation and amplitude of variation of the daily average evaporation, e extreme values of the daily evaporation, the diurnal evaporation (6 a.m. to 6 p.m.) and the octurnal evaporation (6 p.m. to 6 a.m.). The main conclusions of this study are: 1) the almost egligible influence of the wind factor contrasted with the preponderant role played by air tempera-re and humidity; 2) the remarkable influence of the seasonal variation of relative humidity over the tlantic coast; 3) the high annual evaporation (nearly 5000 mm) in the pre-Saharian region; 4) the ndency to a decrease, in the inland and southern regions, of the ratio between diurnal and nocturnal aporation. (*Same item as* 10.7–250, July 1959, *MAB.*) *Subject Headings:* **1. Evaporation Morocco.**—*A.V.*

10K–94 551.573:551.578.46(485)

*Groth, Kjell (*Int. Met. Inst., Stockholm*), **Suppression of evaporation from snow-fields.** *Tellus*, ockholm, 9(2):159–163, May **1957.** 4 col. plates (photos), 5 tables, 3 refs. **DLC**—An outline given of the possibilities of utilizing surface films for the suppression of evaporation from snow

surfaces. Special measures must be taken to ensure the spreading of the films at the low temperatur in question. Preliminary laboratory and field experiments on Stora Lule Lake in northern Lapla during spring 1954–55–56 demonstrated the effect of fatty alcohol films on snow, but definite co clusions as to the ultimate possibilities of the methods and feasibility of their application on a lar scale cannot yet be drawn. (*Same item as* 8.10–209, Oct. 1957, *MAB.*) *Subject Headings:* **1. Eva oration of snow control 2. Alcohol films on snow 3. Lapland.**—*Author's abstract.*

10K–95 551.573:551.579.5(62

Haude, Waldemar, **Über nutzlose Evaporation verschiedener Böden in einem Trockenklim** [On needless evaporation from different soils in a dry climate.] *Meteorologische Rundscha* 10(4):124–127, July/Aug. **1957.** 4 figs., 4 tables. **DWB**—In Egypt potential evaporation w measured in small tanks filled with Nile earth, sand, or $\frac{2}{3}$ sand and $\frac{1}{3}$ earth. Evaporation by THOR THWAITE'S formula was 200 mm in June, 60% of measured value. Annual variation was alm proportional to global radiation and to values given by a freely suspended Piche. Actual evaporati was measured in May through Oct. in tanks filled with earth and Popov cylinders with earth a sand and watered at intervals. Loss from sand in 2 and 7 days was 35% less than from equa moist Nile earth, but water capacity of mixture of earth and sand is less and it must be irrigat more frequently, though needless loss is still less than from Nile earth. (*Same item as* 9.1–2 Jan. 1958, *MAB.*) *Subject Headings:* **1. Evaporation from soil 2. Egypt.**—*C.E.P.B.*

10K–96 551.584:551.551:551.5

Kawahara, Takuma (*Mie Univ., Tsu, Faculty of Agric.*), **Some problems in the atmosph near the ground.** *Kyoto. Univ. Meteorological Research Institute, Meteorological Notes,* Ser. No. 9, **1957.** Reprint from *Tsu, Japan. Mie Univ. Faculty of Agriculture, Bulletin,* No. 14:77– **1957.** fig., 5 tables, 17 refs., 49 eqs. **DWB**—With particular consideration of the stability of layer, the writer treats theoretically the distribution of wind velocity, water vapor, and air te perature in the lower atmosphere near the ground, and obtains formulas on wind profile and ev oration from an unlimited area. His formulas are verified by comparison with recent observatio especially those of DEACON as to wind profile and those of NAMEKAWA as to evaporation. Tak the natural convection in the lower atmosphere as an example of the completely eddying field, author also derives a result somewhat different from that of SUTTON'S theory. *Subject Headin* **1. Micrometeorological observations 2. Wind profiles 3. Evaporation formulas.**—*Author's abstr*

10K–97 551.508.72:551.

*Kuniavskiĭ, M. Ia., **O perekhodnom koeffitsiente isparitelia GGI-3000 dlia Rybinskogo vo khranilishcha.** [Reduction coefficient of the GGI-3000 evaporimeter for the Rybinsk reservo *Meteorologiia i Gidrologiia,* Leningrad, No. 12:45–46, Dec. **1957.** fig., ref., 2 tables, 2 eqs. **DW DLC**—Using four years of data of parallel observations on evaporation from the evaporating ba of the Rybinsk reservoir and the GGI-3000 evaporimeter, the author computed the reduction co cient R of the evaporimeter from the equation $R=E_0/E_1$ where E_0=evaporation from basin E_1=evaporation from the evaporimeter. Also the corrected coefficient r (according to V. I. KUZN SOV), which takes into account the effect of the difference of construction and temperature regim the water in the evaporimeter and basin, is computed from the equation $r=E_0/e_0=l_{200}:E_1/e'_0-$ where e_0 and e' are the maximum water vapor tension at the water temperatures in the basin evaporimeter, and l_{200}=absolute atmospheric moisture at a height of 200 cm. The monthly m values for each month June–October for each year are presented in a table and curves showing deviation of the computed monthly evaporation by means of R and r. Coefficient R gives in 7 of the cases less deviation than r, hence the value of $R=0.87$ is used in calculations for the Rybi reservoir. *Subject Headings:* **1. Evaporimeter reduction coefficients 2. Rybinsk reservoir, U.S.S** —*I.L.D.*

10K–98 551.573:62

Lapworth, Charles F., **Evaporation from the water surface of a reservoir.** (In: I.U.G Association of Scientific Hydrology, Symposia Darcy, Dijon, Sept. 1956, [**Proceedings**], Vo pub. **1957?** p. 7–11. 5 tables, ref.) **DWB** (M79 I61sym)—Rainfall and water levels in a reser were studied from an evaporation tank near London during July 1, 1955 to June 30, 1956. Der values of monthly totals as well as extremes, based on meteorological data, are presented in this pa Actual values obtained from the reservoir and the tank are compared with theoretical values. *Su Heading:* **1. Evaporation from reservoirs.**—*N.N.*

10K–99 551.573

*Loup, Jean, **Note sur l'évaporation au Maroc.** [Note on evaporation in Morocco.] *Revu Géographie Alpine,* Grenoble, 45(2):351–379, **1957.** 6 figs., 9 tables, refs. **DWB**—The evapora

cords from 9 stations in Morocco for 1953–1955 are analyzed and presented in tables and graphs. he effect of temperature—mainly of the maximum temperature of each day—is said to be the main ntrol. Stations are described; instruments and methods discussed; annual, seasonal, monthly, urnal and regional, and elevation effects treated; and calculations made by several methods to ow comparative accuracy. Part played by evaporation in hydrology of the region is discussed. he highest annual value of evaporation in the U. S. is said to be 2460 mm in the Imperial Valley Calif. This compares with the record of 2865 mm at Kadoussa (Oct. 1954–Sept. 1955). Records 6 stations were made with the Houdaille recording evaporimeter, which measures the evaporation nder a shelter and not in the free air or that which would occur over a lake where temperature and midity are modified. Three of the stations on the Sahara side of the Atlas have only the "Colo-do" evaporimeter. Here the fragmentary records indicate an annual pan evaporation of 3500–700 mm (2700–2900 mm or less, actual). (*Same item as* 8.10–210, Oct. 1957, *MAB.*) *Subject eadings:* **1. Evaporation data 2. Morocco.**—*M.R.*

10K–100 551.579.5:551.573

Parkhomenko, M. L., **Vliianie vlazhnost' pochvy na intensivnost' ispareniia vlagi s ee poverkhno-i.** [The influence of soil moisture on intensity of evaporation from the soil surface.] *Pochvove-mie,* Moscow, No. 5:97–99, May **1957.** figs., 2 tables, 7 refs. English summary p. 99. **DWB, LC**—In soil samples (in boxes) having various initial water contents, the author studied the changes soil moisture (by weighing). He found that the highest rate of evaporation takes place when ie water content is close to field capacity. As the amount of water in the soil decreases, the intensity the evaporation decreases. The author suggests several means for reducing water losses by aporation. (*Same item as* 10C–81, March 1959, *MAB.*) *Subject Heading:* **1. Evaporation-soil oisture relationships.**—*Author's abstract.*

10K–101 551.573:551.579.5

Philip, J. R., **Evaporation, and moisture and heat fields in the soil.** *Journal of Meteorology,* 4(4):354–366, Aug. **1957.** 14 figs., 58 refs., 41 eqs. **DWB**—Considers evaporation from drying are soil. There are 3 stages: 1. So long as soil is moist, evaporation rate E resembles that from a turated surface E_s. 2. At intermediate moisture content, E depends only on soil moisture distribu-on. 3. When soil is dry, E depends on heat flux in soil and may be negatively correlated with E_s. n imperfectly evaporating surface may lead to a steady energy balance. Finally, evaporation at fferent depths in the soil through the influence of soil temperature gradients is discussed. (*Same em as* 8.11–206, Nov. 1957, *MAB.*) *Subject Heading:* **1. Evaporation from soil.**—*C.E.P.B.*

10K–102 551.508.72:551.573(47)

†Pushkarev, V. F., **Izuchenie ispareniia s vodnoĭ poverkhnosti i pochvy.** [Study of evaporation om water surfaces and the ground.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby. omitet po Provedeniiu Mezhdunarodnogo Geofizicheskogo Goda, Informatsionnyĭ Sbornik,* No. 4:69–79, **957.** 5 figs., 2 tables, 18 refs. **DWB**—In connection with the IGY program, observations on vaporation from water surfaces and the ground were carried out at 9 points in the U.S.S.R.: Valdai, ubovka, Minsk, Kiev, Odessa, Kamennaia Steppe, Mil, Omsk and Chita. Evaporation from water rfaces was measured by the "GGI-3000" evaporimeter, which is a cylindrical tank with a cone aped bottom of zinc plated sheet iron, its internal diameter is 61.8 cm and its height is 60 cm. It placed in the ground so that its upper edge is 7.5 cm above the soil surface. An evaporating basin as also used; this is a cylindrical basin with a level bottom made out of sheet iron, an internal iameter of 5.04 m and a depth of 2 m. Data are presented showing that the indices of evaporation epend upon the dimensions and manner of installation of the evaporimeters. Evaporation amounts om evaporimeters placed in the ground and from evaporimeters of similar height placed above the round, vary inversely as the area of the evaporimeter and directly to the ratio of perimeter and vaporimeter area. Data are presented showing that in an evaporimeter, installed at the surface f the ground, evaporation is on the average lower between 0100 and 0700 o'clock than between 300 and 1700 o'clock. Under conditions of undisturbed atmospheric flow, evaporation from a ater surface can be measured by the formula $E=c(1+\alpha w_z)(e_0-e_z)$ where E=evaporation in m/24 hours; w_z=wind velocity in m/sec at height z; (e_0-e_z)=difference between vapor tension t the water surface and that at height z (in cm); c and α=factors depending upon measuring units. he measurement of evaporation from the surface of the soil was made with evaporimeters having n area of 500 cm² and heights 50 and 100 cm. The soil evaporimeter GGI-500-50 consists of an nternal cylinder, an outer cylinder-socket and water collecting vessel. The evaporimeters are escribed with the aid of diagrams, data on evaporation from water surfaces are given in graphs nd tables, and evaporation data from evaporimeters obtained in the U.S.S.R. and U. S. are com-ared. *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation from soil 3. Evap-rimeters.**—*I.L.D.*

10K–103 551.573:551.578.4

Salazonov, V. V., **K voprosu ob isparenii s poverkhnosti snega v usloviiakh Iakutii.** [Evap
oration from the snow surface under conditions prevailing in Yakutia.] *Moscow. Tsentral'n
Institut Prognozov, Trudy*, No. 58:121–126, **1957.** fig., 2 tables, 11 refs. **DLC, DWB**—A series o
observations were made during the spring of 1950 and 1951 in Yakutia in order to determine th
magnitude of evaporation from snow cover. Evaporation was measured by the weighing metho
which involved the use of small uniform boxes filled with snow and placed within the natural sno
cover. Evaporation at night is considerably less than by day. When the absolute humidity of th
air is less than 6.1 mb evaporation of snow takes place, but not when the absolute humidity exceed
6.1 mb. During snow melting, when the air temperature is equal to zero, the maximum vap
tension above the snow is 6.1 mb. With increasing air temperature, evaporation diminishes—abo
1.5–2.0°C—condensation takes place. A formula expressing the relationship of daily evaporatio
from a snow surface to moisture deficit (d) and wind velocity is determined empirically, name
$E = 0.20d^{0.94}$. Numerical data giving the evaporation observation and the computed relationsh
between daily evaporation, moisture deficit and wind velocity are presented. (*Same item as* 10.4–24
April 1959, *MAB.*) *Subject Headings:* **1. Evaporation from snow cover 2. Evaporation measur
ments 3. Yakut A.S.S.R.**—*I.L.D.*

10K–104 551.573:551.482(282.243.

Schmuck, Adam, **Pomiary parowania na Odrze pod Wrocławiem (Komunikat wstepny).** [Mea
urement of evaporation of the Oder near Wroclaw, Pt. 1.] *Przeglad Geofizyczny*, Warsaw, 2(1/2):3.
39, **1957.** 4 figs., 2 tables, 4 refs. French summary p. 39. **DWB, DLC**—Preliminary results
evaporation measurements of Oder River waters near Wrocław carried out with the aid of a Sovi
GGI evaporimeter in the period July 1954–Oct. 1956 are presented and discussed. It has be
found that the amount of evaporated water in summer is three times greater than it is in the wint
period, and that evaporation declines with the increase of altitude. (*Same item as* 10.3–278, Mar
1959, *MAB.*) *Subject Headings:* **1. Evaporation from rivers 2. Evaporimeters 3. Oder Rive
Poland.**—*A.M.P.*

10K–105 551.573:551.48(77

†Shaw, Robert H. (*Prof. Agri. Climatology, Iowa State College*), **Comparison of methods
estimating evaporation from small water surfaces in Iowa.** Submitted Aug. 9, **1957** to the U.
Weather Bureau in compliance with Memorandum of Understanding, Cwb-8808, May 1956. 45
21 figs., 8 tables, 25 refs. Carbon of typescript. **DWB** (M73 S535co)—Small pond evaporatio
as measured by three of the multiple methods existing, is discussed in relation to degree of effectivi
The study involves a review of literature, relationship of evaporation and evapotranspiratio
evaporation from pan vs. pond and soil moisture data. The results are presented in graphs a
tables. (*Same item as* 10C–105, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation from sm
water surfaces 2. Evaporation estimation 3. Iowa.**—*W.N.*

10K–106 551.573:628

Sutherland, K. L., **Economic methods of controlling evaporation of water.** *Research*, Lond
10(5):198–205, May **1957.** 8 figs., 10 refs. **DWB** (P)—As early as 1925 it was demonstrated tha
monomolecular film on a water surface reduced evaporation, LANGMUIR later confirmed this as
four Russian workers (1936–1940). For some obscure reason multimolecular films were prefer
and the monomolecular research shelved until MANSFIELD resumed the work in 1953. MANSFIE
analyzed the factors involved and focused his interest on the property of self-healing which
hexadecanol possessed and from this point he started experimenting. This paper gives an acco
of results obtained with his raft method, which is now being further improved for practical applicati
MANSFIELD will report on these tests along with results obtained. The gain surpasses by far
expenses involved. *Subject Headings:* **1. Evaporation control 2. Cetyl alcohol.**—*W.N.*

10K–107 551.501:551.573:551.57

Suzuki, S. and Maruyama, E. (*both, Met. Agency, Tokyo*), **Determination of evaporation fro
soil surface by measuring the gradient of soil moisture.** *Japan. Meteorological Agency, To
Memoirs of Industrial Meteorology*, 21(1):33–38, **1957.** Also in: *Journal of Agricultural Meteorol
Tokyo, 13(2):45–48, Oct. **1957.** 2 figs., 3 tables, 4 refs., 8 eqs. In Japanese; English summa
p. 38 and 48. **DWB**—A formula is developed for calculating evaporation from soil moisture val
at 0.5 cm, 1.5 cm and 2.5 cm below the ground surface. The formula is based on the assumpt
that moisture distribution in soil is subject to the same function as temperature in a conduc
The formula is applied to actual measurements and found to yield results of an acceptable orde
magnitude. *Subject Headings:* **1. Evaporation from soil 2. Soil moisture gradients 3. Evaporat
measurement techniques.**—*G.T.*

10K–108 551.511.6:551.515.81:551.573

Tseĭtin, G. Kh., **Nekotorye voprosy transformatsii vozdushnykh mass i teorii isspareniia.** [Problems in air mass transformation and evaporation theory.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 71:169–183, **1957.** 2 figs., tables, 14 refs., 68 eqs. **DWB** (M(055) U581tG)—The solution of the problem involving the transformation of air masses under the influence of wind velocity profiles, coefficients of turbulent diffusion and various limiting conditions of the underlying surface is presented. The wind velocity and the coefficients of turbulent diffusion (both horizontal and vertical) are taken as power functions of height up to a certain level, above which they are regarded as constants. The limiting conditions on the underlying surface are given in the formula

$$-k_z \frac{dq}{dz} = \varphi(x,y) - A\,[q(x,y,z)_{z=0} - \varphi(x,y)],$$

where q—substance of air mass undergoing transformation and A—constant. The equation of stationary turbulence diffusion

$$u \frac{dq}{dx} = \frac{\partial y}{\partial y} k_y + \frac{\partial q}{\partial y} + \frac{\partial}{\partial z} k_z \frac{\partial q}{\partial z}$$

for these limiting conditions is integrated by the method of Fourier and a general operational method. Also an expression for local evaporation is derived if the relative humidity under the air mass is taken into account. From the general solution special partial solutions for the transformation of an air mass are derived. These include the role in horizontal turbulent mixing of the distribution of moisture over a limited body of water and local evaporation from the surface in case of a square and a rectangular body of water; total evaporation from limited bodies of water (rectangular reservoirs) and approximate determination of reduction coefficients of evaporators (square or circular). (*Same item as* 10.5–227, May 1959, *MAB.*) *Subject Headings:* **1. Air mass transformation 2. Turbulent diffusion 3. Evaporation from water surfaces.**—*I.L.D.*

10K–109 551.573:551.579.2

***Zhigalov, I. I. and Grishin, I. S., **O poteriakh vlagi na isparenie s poverkhnosti snezhnogo pokrova i pochvy za period snegotaianiia i stoka talykh vod.** [Water losses by evaporation from the surface of snow cover and soil during the thawing and runoff of melted snow.] *Pochvovedenie*, Moscow, No. 12:107–111, **1957.** 3 tables, 8 refs. English summary p. 111. **DLC**—The authors present the results of investigations on the evaporation of moisture from snow cover and soil surfaces during the period of snow melting and run-off of melt water carried out in the Zvenigorod district of Moscow Oblast during the spring of 1952–1953. The evaporation of moisture from snow cover during the snow melt period (7–9 days) is small and amounts to 2–3 mm or 2–3% of the total water reserves on the plots. The evaporation of moisture from the surface of frozen, and melting, wet structureless loamy soil is greater under the same conditions and for the period of melt water runoff (7–9 days) it amounts to 15.8–17.6 mm for cultivated land and winter crops, or 14.1–18.5%; for clover of the third year of utilization it amounts to 12.7 mm or 11.1% of the total water reserves over the plots. In computing the total evaporation of moisture from snow cover and soil, it is necessary to take into account the total area of thawing for the period of trace deposition of snow cover. In the case of negative gradient air temperatures and low wind velocities the method of gradient observations even with ordinary meteorological instruments gives fully satisfactory results for computing total evaporation of moisture from the surface of soaked and thawing soil; but this method gives unsatisfactory results for computing total evaporation from the surface of snow cover during the thawing period. Numerical data on evaporation and on meteorological elements during the spring period 1942–1952 are presented. *Subject Headings:* **1. Evaporation of snow 2. Snow melt runoff.**—*I.L.D.*

1958

10K–110 551.573:551.464

Bonython, C. W. (*ICI Alkali (Anst.) Pty. Ltd. South Australia*), **The influence of salinity upon the rate of natural evaporation.** *UNESCO, Arid Zone Research*, 11:65–71, pub. **1958.** 6 figs., 2 tables, 12 refs., 5 eqs. French summary p. 70. **DWB** (M84 US8cl)—The author shows that the lower rate of evaporation (and higher temperature) of saline as compared to fresh water is predicted quantitatively in the "combined sink strength-energy balance" theory of PENMAN and FERGUSON. He adapts FERGUSON'S equation to describe the evaporation of saline water. A comparison of calculated and measured evaporation amounts shows agreement at low salinity, but considerable discrepancies at higher salinities. *Subject Headings:* **1. Evaporation from seas 2. Salinity effects on evaporation.**—*G.T.*

10K–111 551.573(662

Bouchardeau, André, **Etudes d'évaporation dans les régions Sahelo-Soudaniennes.** [Evap oration studies in the Sahel-Sudan Regions.] *International Union of Geodesy and Geophysic Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 407 420. 5 figs., 6 tables. French résumé p. 407. **DWB** (M(06) 1611g)—The results of the 3-yea investigations of evaporation in the Lake Chad region (Sahel-Sudan area) are discussed in this repo after a systematic study of the data. Summaries of the results obtained from various Frenc meteorological stations indicate the maximum and minimum temperatures and vapor pressur The report concludes with a comparison of the theory developed here with the actual effects dete mined for lake regions. *Subject Headings:* **1. Evaporation data 2. Lake Chad region, Africa.**—*N.N*

10K–112 551.573:628.1

Crow, F. R. and Daniel, E. R. (*both, members ASAE*), **Chemicals for controlling evaporatio from open water surfaces.** *American Society of Agricultural Engineers, Transactions*, 1(1):72–7 **1958.** 6 figs., tables, 10 refs. **DWB**—Evaporation in ponds and larger reservoirs is being studie The authors describe the ways and means of suppressing such evaporation and also discuss th results of the present evaporation treatment where the pond and pan tests have shown the poss bilities in the suppression of pond evaporation. This indicates that the farm and industrial ente prises will have enough water for their operations during the next 50 years. *Subject Headin* **1. Evaporation control.**—*N.N.*

10K–113 551.573:551.48(438

*Demiańczuk, P. P. (*Polish Hydrological & Met. Institute*), **Evaporation de la surface libre d l'eau dans les conditions naturelles en Pologne.** [Evaporation from a free water surface unde natural conditions in Poland.] *International Union of Geodesy and Geophysics. Association o Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 385–398. 14 table 8 refs., 35 eqs. **DWB** (M(06) 1611g)—The Polish Institute of Hydrology and Meteorology has in vestigated the evaporation that goes on from a free water surface under the natural condition prevailing in their state. The average values of atmospheric pressure have been determined em pirically for the years 1929 through 1934. This includes some monthly evaluations of the theoretic and measured units. *Subject Headings:* **1. Evaporation from water surfaces 2. Poland.**—*N.N.*

10K–114 551.573:551.579.5:551.49

Gardner, W. R. and Fireman, Milton (*both, U. S. Dept. of Agri.*), **Laboratory studies of evap oration from soil columns in the presence of a water table.** *Soil Science*, Baltimore, 85(5):244–24 May **1958.** 7 figs., 8 refs., 5 eqs. **DLC**—The experimental rates of evaporation of water fro laboratory soil columns have been compared with the theoretical solutions of the steady-state un saturated moisture-flow equation. Good agreement between theory and experiment was foun The evaporation rate is determined by climatic factors which control the external potential evapora tion or by the maximum rate of upward movement of water in the soil, whichever is the lesser. Th evaporation rate is shown to be inversely proportional to the thickness of a surface mulch when th rate of vapor movement through the mulch is less than the potential evaporation. (*Same item o* 10.5–284, May 1959, *MAB.*) *Subject Headings:* **1. Evaporation from soil 2. Water table.**—*Author abstract.*

10K–115 551.573:551.579

Hallaire, M. (*Station de Bioclimat. de Versailles, Inst. Nat'l. de la Recherche Agronomique, France* **Diffusion de l'eau à l'état vapeur et liquide au voisinage de la surface d'évaporation et desséchemer superficiel du sol.** [Diffusion of water in vapor and liquid state in the vicinity of the surface evaporation, and the surface drying of the soil.] *International Union of Geodesy and Geophysic Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 2, pub. **1958.** p. 46 480. 9 figs., 25 eqs. **DWB** (M(06) I611g)—If the surface of a column of earth is subject to eva oration E (mm/day), the latter represents the total expenditure at the surface, while the expenditu dQ/dt at depth z is obtained by reducing E by the water loss between the 0 and z levels. It can the be shown that a relation of the form

$$\frac{dQ}{dt} = A\frac{dH}{dz} + B$$

exists at all times between the expenditures dQ/dt at different depths and the corresponding moistu gradients dH/dz, where A and B are constant at any given moment. In order to explain this resu it had to be assumed that the total surface expenditure E is the sum of the two terms B and Δ. B the expenditure provided for by the over-all displacement of a liquid film from the depth to th evaporating surface. The term Δ behaves as if it corresponded to the diffusion of a mass of wat and vapor originating from evaporation inside the mass of soil. This apparent intra-mass evapor

ion Y (mm/day/layer of 1 cm) varies with depth z according to the exponential law $Y = Ys$ exp $(-z/a)$. Consequently the component $\Delta = \int Ydz$ of evaporation contributes considerably to the drying of the uppermost layers of the soil and to the natural formation of mulch which impedes evaporation. Also the amount of water loss, when such mulch appears, depends essentially on the relative portion of the vapor expenditure Δ/E. *Subject Headings:* **1. Diffusion of water 2. Evaporation from soil 3. Soil drying.**—*Transl. of author's abstract.*

10K–116 551.506.1:551.579.1:551.573(791,793):551.481.1

†*Harbeck, G. Earl, Jr.; Kohler, Max A.; Koberg, Gordon E., et al., **Water-loss investigations: Lake Mead studies.** *U. S. Geological Survey, Professional Paper*, No. 298, **1958.** 100 p. 46 figs., plate (fold. in pocket), 35 tables, 37 refs. **DGS**—The 3rd and final report on water losses at Lake Hefner and Lake Mead, covering the March 1952–Sept. 1953 measurements and studies made on Lake Mead by U. S. Bureau of Reclamation, U. S. Weather Bureau, U. S. Geological Survey and U. S. Navy Bureau of Ships and Electronics Laboratory. (For 1st and 2nd reports, covering the Lake Hefner studies see 10K–28.) Pan and lake evaporation are discussed by M. A. Kohler, T. J. Nordenson and Wm. E. Fox, and conclusions are set forth by Harbeck and Kohler. Extensive tables of daily data are given. Equipment and installations are illustrated by excellent full page photos, and analyzed results presented in tables and graphs. Data include precipitation, air temperature, incoming radiation, lake temperature and salinity profiles, wind, humidity, reflected radiation, long wave radiation from lake, pan and lake evaporation, cloud cover, etc. Both energy budget and mass transfer techniques were used to determine the evaporation from Lake Mead during March 1952–Sept. 1953. Sutton-Sverdrup's equations used in Lake Hefner studies could not be used on Lake Mead. Total evaporation in 1953 was found to be 875,000 acre ft, or a depth of 86″ or about 7 ft over the total area of the lake. Maximum monthly evaporation was 117″ in Aug. 1952 and minimum 40″ in Jan. 1953. Wind and humidity did not vary the same way with height. The pan coefficient was 0.70. (For a fuller abstract, *see* 10.5–4, May 1959, *MAB.*) *Subject Headings:* **1. Water loss investigations 2. Evaporation from lakes 3. Limnology 4. Lake Mead, Arizona-Nevada. I. U. S. Bureau of Reclamation II. U. S. Weather Bureau III. U. S. Geological Survey IV. U. S. Navy Electronics Lab. V. U. S. Navy Bureau of Ships VI. Nordenson, T. J. VII. Fox, Wm. E.**—*M.R.*

10K–117 551.511.32:551.46:551.573(52)

Ito, N., **On the evaporation from the Japan Sea during the winter monsoon.** *Journal of Meteorological Research*, Tokyo, 10(3):173–178, March **1958.** 4 figs., 2 tables, 11 refs., 20 eqs. In Japanese; English summary p. 173. **Comments** by Ohsawa, K., *Ibid.*, 10(6):535–536, June **1958. DWB, DLC**—The water source of snow falling on the mountainous region in central Japan, accompanied by the monsoon in winter, is almost evaporated from the Japan Sea. In this case, the temperature difference between air and sea surface is very large, and such a condition is rare all over the world. The author calculated the differences of moistures and those of sensible heat energies in the atmospheric columns between two stations, Vladivostok and Wajima, by means of aerological data. And then he tried to determine the coefficient k in the following evaporation equation:

$$E = k(e_s - e_a)U,$$

E: evaporation, e_s: saturated vapor pressure at the sea surface temperature, e_a: vapor pressure in air, U: wind velocity. This value of k is close to that derived by H. U. Sverdrup (1946) on the rough sea surface. (*Same item as* 10.2–194, Feb. 1959, *MAB.*) *Subject Headings:* **1. Evaporation from seas 2. Japan.**—*Author's abstract.*

10K–118 551.573:628.13

Kokoulin, P. P. and Iatsenkovskiĭ, G. L., **K voprosu o raschete isparenііa s poverkhnosti vodokhranilishch.** [Calculation of evaporation from reservoir surfaces.] *Tsimlianskaia Gidrometeorologicheskaia Observatoriia, Sbornik Rabot*, No. 1:135–148, **1958.** 5 figs., 4 tables, 10 refs., 4 eqs. **DLC**—The evaporation station of the Tsimliansk observatory and its observational methods are described in detail. On the basis of observational data for 1954–1956 the authors develop a new formula for calculating evaporation from a water surface, namely $E = 0.09\ (e_0 - e_{200})\ (1 + w_{200})$ mm/day, where E = evaporation rate, e_0 = vapor pressure at the temperature of the evaporating surface and e_{200} and w_{200} are vapor pressure and wind speed at 200 cm over the evaporating surface. From a comparison of calculations according to this formula with observational data of 3–7 years for 12 evaporation stations in different geographic locations throughout European U.S.S.R. the authors conclude that the quality of observations at the majority of evaporation stations is poor (because of leaking evaporimeters, lack of representativeness of the stations, and careless maintenance), as measured evaporation is consistently higher than that calculated according to the authors' formula. *Subject Headings:* **1. Evaporation from reservoirs 2. Evaporation calculation 3. European U.S.S.R.**—*Referetivnyĭ Zhurnal, Geofizika*, 7067, 1959.

10K–119 551.573:551.578.1

Krustanov, L. and Panchev, St., **Ob isparenii svobodno padaiushchikh malen'kikh vodianykh kapel' v atmosfere.** [Evaporation of free falling small water drops in the atmosphere.] *Studii Geophysica et Geodaetica*, Prague, 2(2):181–185, **1958.** 2 figs., table, 2 refs., 19 eqs. German summary, p. 185. **DWB**—The Maxwell equations are introduced, with the Leibenzon correction factor for the influence of air currents on evaporation of a falling drop, leading to a relationship between drop diameter and the distance fallen, or the free path in a horizontal air current, and the evaporation rate. *Subject Heading:* **1. Evaporation of raindrops.**—*M.R.*

10K–120 551.573:551.48

MacConnell, R. J. (*U. S. W. B., Fort Worth, Texas*), **U. S. Weather Bureau activities in evaporation investigations.** *Texas A. and M. College, College Station, Proceedings of the 3rd Annual Conference on Water for Texas, Sept. 1957*, (issued **1958**?). p. 31–33. 9 refs. **DWB** (M79 C748pro); **DLC** (TD201.T37)—The U. S. Weather Bureau has conducted studies that have been aimed toward the development of improved methods for estimating annual lake evaporation from pan observations and related meteorological data normally collected in its established observational program. *Subject Headings:* **1. Evaporation from lake 2. U. S. Weather Bureau evaporation researches.**—*N.N.*

10K–121 551.573:628.1

Mansfield, W. W. (*Div. of Industrial Chem., CSIRO, Melbourne*), **Reduction of evaporation of stored water.** *UNESCO, Arid Zone Research*, 11:61–64, pub. **1958.** 10 refs. French summary p. 63. **DWB** (M84 US8cL)—The method of reducing evaporation by means of monomolecular layers of cetyl alcohol is described. Problems of dosage, techniques of application, effect of waves and results of field trials are discussed. It is estimated that the procedure will reduce evaporation by 50% under conditions existing in Australia. The method is found promising economically. *Subject Headings:* **1. Evaporation control 2. Cetyl alcohol.**—*G.T.*

10K–122 551.573:551.481(82

Marchetti, Adolfo A., **La evaporación en los lagos naturales y artificiales.** [Evaporation from natural and artificial lakes.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 462–467. 4 figs., 2 tables, ref. **DWB** (M(06) I611g)—A study of evaporation from natural and artificial lakes in Buenos Aires, Córdoba and Cipoletti (all of Argentina) has been made. The results of monthly data for the period 1943 through 1952 are tabulated, indicating the average amount of evaporation in mm for each month and that of temperature in °C. During January–June period, the Buenos Aires humidity is much higher, 74%, than at any of the other stations. The wind is also much higher here, 11.6 km/hr, than at the other stations during the second half of a year. Graphs and figures are included. *Subject Headings:* **1. Evaporation from lakes 2. Argentina.**—*N.N.*

10K–123 551.573:551.311.1(9

Mellor, Malcolm (*Dept. of External Affairs, Australia*), **(Discussion of) Harry Wexler: Some aspects of Antarctic geophysics (and) Reply** by Wexler. *Tellus*, Stockholm, 10(4):498–499, Nov. **1958.** 12 refs. **DLC**—MELLOR, using evaporation data obtained by LOEWE, and others in coastal areas of Antarctica, concludes that evaporative ablation of Antarctic ice is, in fact, appreciable (0.27×10^{18} gm/yr) and may equal other terms in the ice budget proposed by H. WEXLER (1958) and would be definitely higher than the calving loss, even if the value were only $\frac{1}{10}$ the above, would still merit consideration. WEXLER replies that the evaporation in coastal areas, even if correct, would likely be offset by deposition, in the form of hoar frost, in the vast inland glacial region, hence the total might be 0.29×10^{18} gm/yr deposition instead of 0.27×10^{18} gm/yr evaporation as proposed by MELLOR. However, both evaporation and deposition figures are questionable. IGY observations should help solve the question. (For Wexler's original article, *see* 10.3–54, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation from Antarctic ice 2. Glacial ablation 3. Antarctic ice budget 4. Antarctica. I. Wexler, H.**—*M.R.*

10K–124 551.481.1:551.579:551.573(49

Neamtu, Victoria, **Lacul Căldărușani: contribuții la cunoașterea regimului hidrologic.** [The Căldărusani Lake: contributions to the knowledge of its hydrological regime.] *Meteorologia Hidrologia și Gospodărirea Apelor*, Bucharest, 3(2/3):124–127, **1958.** fig. **DWB**—Morphological and hydrological characteristics of Căldărușani Lake are briefly described. A diagram is presented showing monthly values (June–Oct. 1954, May–Nov. 1955 and May–Sept. 1956) of each element contributing to the water balance of the lake. These include precipitation data obtained with a rain-gage installed at the lake, and evaporation values obtained by direct measurement. *Subject Headings:* **1. Lakes 2. Evaporation from lakes 3. Căldărușani Lake, Romania.**—*G.T.*

10K–125 551.511:551.573:551.526.8:551.481.16(569.4)

Neumann, J., **Tentative energy and water balances for the Dead Sea.** *Research Council of Israel, Bulletin, Section G,* 7(2/3):137–163, Oct. **1958.** 4 figs., 8 tables, 24 refs., 33 eqs. **DWB, DLC.** Reprinted as *Israel. Meteorological Service,* [*Publications*] *Series A, Meteorological Notes,* No. 16, **1959.**—The average annual rates of evaporation from the northern and southern basins of the Dead Sea are calculated from the energy balance of the sea. The resulting evaporation rates are as follows: northern basin, 150 cm yr^{-1} (nominally, 147 cm yr^{-1}); southern basin, 180 cm yr^{-1}. For the Dead Sea as a whole, the rate works out as 155 cm yr^{-1}. Next, from a combination of the energy balance and water balance approaches, average monthly evaporation rates are derived. These figures and figures for monthly lake level change lead to estimates of monthly inflow of water into the lake. Finally, the figures for monthly inflow are partitioned into component terms in a tentative manner. One of the conclusions of the analysis is that the underground inflow of water to the Dead Sea is at most of the order of 10^1 m^3 yr^{-1}. *Subject Headings:* **1. Evaporation from seas 2. Water balance of Dead Sea 3. Dead Sea.**—*Author's abstract.*

10K–126 551.554 551.573:551.46

Ogata, T. et al., **On the meteorological condition near the sea surface at "Tango," Pt. 1.** *Journal of Meteorological Research,* Tokyo, 10(3):164–172, March **1958.** 4 figs., 3 tables, 10 refs., 4 eqs. In Japanese; English summary p. 164. **DWB, DLC**—The authors examined the wind velocity along vertical near the sea surface and the evaporation from the sea surface at "Tango" (29°N, 135°E), and obtained results as follows: 1) Wind velocity distribution along vertical near the sea surface is given as

$$\frac{u}{u_s} = a \log_{10} \frac{z}{z_s} + b,$$

where u is the wind velocity at altitude z above the sea surface, u_s that at a fixed level z_s ($z_s = 11.12$ m); and a and b vary according to the stratification of air layer as

$$a = 0.256,\ b = 0.994 \text{ (isothermal)}$$
$$a = 0.356,\ b = 1.101 \text{ (lapse)}.$$

Here "isothermal" expresses a case where the difference between surface water temperature and air temperature at $z = 6.5$ m is $+0.3°$ to $-0.3°$C, and "lapse" a case where the difference is larger than 0.4°C. 2) Evaporation from the sea surface was observed on the raft as shown in Photo 4 (Tables 2 and 3). The result shows that the amount of evaporation is larger than that calculated by SVERDRUP's theoretical formula. (*Same item as* 10.5–101, May 1959, *MAB.*) *Subject Headings:* **1. Wind velocity distribution 2. Evaporation from sea surfaces 3. Ocean Weather Station Tango.** —*Authors' abstract.*

10K–127 551.573:551.481.1(479.25)

Ogneva, T. A., **Raschet ispareniia s poverkhnosti oz. Sevan.** [Calculation of evaporation from Lake Sevan.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 78:16–24, **1958.** 3 figs., 3 tables, 5 refs., 4 eqs. **DLC**—Meteorological elements over Lake Sevan were investigated by an expedition of the Soviet Main Geophysical Observatory in July 1956. Evaporation was determined by evaporimeters on the shore and on floats, by the diffusion method [$E = 0.114\, u_1 \times (e_0 - e_2)$, where E = evaporation rate in mm/day, u_1 = wind velocity at 1 m height in m/sec., e_0 and e_2 are vapor pressure in mb at 0 and 2 m height at the prevailing water temperature], by the heat balance method and by an empirical formula developed by V. K. DAVYDOV in 1935. Good agreement was obtained between results of the floating evaporimeter, the diffusion and the heat balance methods (the diffusion method has the advantage of being suited for computation at short time intervals). The shore evaporimeters consistently gave excessive values, while DAVYDOV's formula was found to be defective in not taking adequate account of wind speed. *Subject Headings:* **1. Evaporation from lakes 2. Evaporation calculation 3. Lake Sevan, Armenian S.S.R.**—*G.T.*

10K–128 551.573:551.551:551.481.1(584.6)

Ogneva, T. A., **Opyt rascheta ispareniia s poverkhnosti vody i teploobmena s vozdukhom oz. Balkhash.** [Attempt at calculating evaporation from the surface of Lake Balkhash and its heat exchange with the atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 78:120–124, **1958.** fig., 6 tables, 5 refs., 3 eqs. **DLC**—From observational data obtained in the summer 1955 evaporation and turbulent heat flow from the surface of Lake Balkhash were calculated by means of the diffusion method, using the formulas

$$LE = 0.34 K_0 (e_0 - e_2) \text{ cal./cm}^2\text{/month}, \quad \text{and} \quad P = 0.22 K_1 (T_0 - T_2) \text{ cal./cm}^1\text{/month},$$

where LE = evaporative heat loss (E = evaporation, L = latent heat of vaporization), K_1 = turbulence coefficient (in m^1/sec.) at 1 m, e_0 = surface vapor pressure at T_0 water temperature, e_2 and T_2 are

vapor pressure and temperature at 2 m (e_0 and e_2 in mb, T_0 and T_2 in °C). As a result of these calculations curves of the mean daily variations of the differences T_0-T_2 and e_0-e_2, and of the values LE and P are drawn for Lake Balkhash in summer. Monthly mean values of E and P are computed for the warm months (May to October). It is shown that the daily average value of P is small compared to that of LE, but during the night the two values are comparable. Evaporation shows only slight daily variations and comparatively little annual variation, with a maximum in summer and small values in fall. Such an annual march of evaporation appears to be characteristic of shallow bodies of water. Evaporation values obtained by the diffusion method are compared with those obtained by formulas based on the transformational theory of evaporation, with good agreement. It is also shown that evaporation does not vary much with location over the area of the lake. *Subject Headings:* **1. Evaporation from lakes 2. Evaporation calculation 3. Heat exchange over lakes 4. Turbulent exchange over lakes 5. Lake Balkhash, Kazakh S.S.R.**—*Referativnyĭ Zhurnal, Geofizika*, 6027, 1959.

10K–129 551.573:551.578.11

Panchev, St., **Vŭrkhu izparenieto na dŭzhdovnite kapki v sloia mezhdu oblaka i zemiata.** [Evaporation of raindrops between cloud and earth.] *Khidrologiia i Meteorologiia*, Sofia, No. 6:44–52, **1958.** fig., table, 10 refs., 37 eqs. Russian and English summaries p. 52. **DLC**—The evaporation of freely falling raindrops in the atmosphere is analyzed theoretically. The evaporating raindrops are treated as a body of changing mass, by the method of MESHCHERSKII. The formulas for the falling velocity of droplets of different radii are presented, and relationships between distance traversed by the droplet and its radius are derived. *Subject Heading:* **1. Evaporation of raindrops.**—*From author's abstract.*

10K–130 551.573:551.579.5

Philip, J. R. (*Div. of Plant Industry, CSIRO, Australia*), **Evaporation from soil.** *UNESCO Arid Zone Research*, 11:117–122, pub. **1958.** 7 figs., 27 refs., 12 eqs. French summary p. 122. **DWB** (M84 U58cL)—An analytical method of calculating evaporation from bare soil is developed for the case when the surface is so dry that water loss is limited by the rate of water movement upwards. Equations are derived and presented graphically for steady state models of evaporation: the isothermal problem, energy balance at conducting and evaporating soil surfaces, the site of the phase transformation, influence of the soil heat flux, etc. The analysis suggests that there are three phases to the desiccation of a given soil profile: a) while the soil is sufficiently moist, the evaporation rate E, is indistinguishable from that from a saturated surface, E_s; b) at intermediate moisture contents, E will be independent of E_s, and dependent only on the soil moisture distribution; c) when the surface layers of the soil are sufficiently dry, E is sensitive to the heat flux in the soil, and a negative correlation between E and E_s may follow. It, therefore, appears futile to seek to relate evaporation from soils with dry surfaces in the "evaporating power of the air" as represented by evaporation from water surfaces or "wet" solid. The analysis illustrates the dominant influence of the net short-wave radiation and the soil moisture status on the microclimate of bare soils (especially the surface temperature). *Subject Headings:* **1. Evaporation from soil 2. Soil moisture movement.**—*From author's abstract.*

10K–131 551.573:628.11

Sayed, Abdel Aziz S. (*Meteorologist, Headquarters*), **Water saving through reduction of evaporation: preliminary report on evaporation control experiments.** *Sudan. Meteorological Service Technical Note*, No. 1, **1958.** 7 p. 4 figs., 8 tables, 6 refs. **DWB** (M(055) S943te)—Preliminary results of the use of cetyl alcohol dissolved in paraffin on water surfaces, to reduce evaporation, are reported. Although the results were obtained in experiments involving small pans rather than large reservoirs, they appear to justify the hope that evaporation could be reduced by 30 to 50% which would represent important savings considering that annual evaporation is 2 in. in some parts of Sudan. *Subject Headings:* **1. Evaporation control 2. Cetyl alcohol.**—*G.T.*

10K–132 551.573:551.577(438)

Schmuck, Adam, **Der Wert P-E (Niederschlag minus Verdunstung) bei freien Wasserobeflächen in Polen: ein Berechnungsversuch.** [An attempt to calculate the P-E (precipitation minus evaporation) index for free water surfaces in Poland.] *Acta Geophysica Polonica*, Warsaw, 6(1):5–1 **1958.** 9 figs., 4 tables, 7 refs. Polish summary p. 17. **DWB, DLC**—A paper dealing with the problems of evaporation from free water surface in Poland. In his calculations the author proceeds from the premise that the value P-E (precipitation minus evaporation from free water surface in the period of rainfalls) is one of the climatological indexes. Evaporation is calculated according to the formula $E=30\,d$, where E is the sum of annually evaporated water, and d is the sum of mean monthly air-moisture deficit. Graphs show the distribution of evaporation intensity and the P-E value in Poland. A graph illustrates the dependence of the same value on height above se

evel. (*Same item as* 10.6–246, June 1955, *MAB.*) *Subject Headings:* **1. Precipitation-evaporation (P-E) 2. Evaporation 3. Poland.**—*A.M.P.*

10K–133 551.501.4:551.573:551.571(47)

Timofeev, M. P. and Ogneva, T. A., **Zavisimost' isparenиia ot defitsita vlazhnosti vozdukha.** [Dependence of evaporation on the atmospheric moisture deficit.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 78:3–9, **1958.** 3 figs., 3 tables, 8 refs., 9 eqs. **DLC**—The following formula for rate of evaporation (E) from a water surface is analyzed: $E = au_1(e_n - e')$, where a = a coefficient depending on characteristics of turbulent exchange and dimensions of the body of water, u_1 = wind speed at height z_1, e_n = highest possible humidity corresponding to the water surface temperature, e' = atmospheric humidity on shore. It is pointed out that water surface temperature data is often lacking and therefore the value $e_n - e'$ is replaced by the atmospheric moisture deficit $D = e_{max}(T') - e'$, where e_{max} (T') = highest humidity at the atmospheric temperature (T') on shore. It is shown that such calculation of evaporation from moisture deficit only, and without consideration of the temperature difference water-atmosphere, will lead to significant errors in many cases. Sample calculations are included for several lakes and reservoirs in the U.S.S.R. *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation calculation 3. U.S.S.R.**—*Referativnyĭ Zhurnal, Geofizika*, 4966, 1959.

10K–134 551.511.32:551.573

Tomitaka, S., **The amount of evaporation in the light of energy budget.** *Journal of Meteorological Research*, Tokyo, 10(3):198–204, March **1958.** 6 figs., 5 tables, 4 refs., 13 eqs. In Japanese; English summary p. 198. **DWB, DLC.** Also: Ito, N., [**Comments**] . . . [**and**] **Reply by Tomitaka.** *Ibid.*, 10(6):536–537, June **1958.** 2 refs. In Japanese. **DLC**—In order to estimate the amount of evaporation, the energy-balance method is employed. Energy consideration at the boundary between the air and the stagnant water leads to the following relation:

$$I = rI + I_B + K + E + c\rho k^2 \frac{\partial T}{\partial z}$$

where I = incoming solar radiation, rI = reflected solar radiation, I_B = upward flux of (long wave) radiation, K = flux of sensible heat from the surface, E = heat consumed for evaporation, and $c\rho k^2 \frac{\partial T}{\partial z}$ = downward flux of heat carried into the water and stored there. From this the following equation is obtained to estimate the amount of daily evaporation.

$$\epsilon = \sum_{i=1}^{n} \frac{I_i(1-r)_i - I_{Bi} - c\rho k^2 \left(\frac{\partial T}{\partial z}\right)_i}{(1+q)_i L}$$

where ϵ = amount of evaporation (mm/day), L = latent heat of evaporation = 590 cal/gr and the summation is taken for every hour. The amount of evaporation on fair days is calculated for each month in 1956. These values agree fairly well with the measurements by evaporation pan, considering the assumption employed here that the water temperature is constant and Bowen's ratio is roughly equal to 0.1. Several remarks are added for the method of observation with evaporation pan. (*Same item as* 10.3–214, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation estimation 2. Energy balance method of evaporation calculation.**—*Author's abstract.*

10K–135 551.501.4:551.573

Ubell, Károly, **Nagyobb vízfelületek párolgási veszteségeinek meghatározása párolgásmérő kádak segítségével.** [Measurement of evaporation losses from larger water surfaces by means of evaporation tanks.] *Időjárás*, Budapest, 62(1):26–38, Jan./Feb. **1958.** 5 figs., 3 photos, 2 tables, 11 refs., 16 eqs. English summary p. 26. **DLC**—On the basis of data obtained in a series of observations over 5 years by means of two evaporation tanks the following results were obtained: 1. connections were found between the evaporation of the water-surface of the pan and the weather elements. 2. constants of semi-empiric formulas based on DALTON'S rule were determined, 3. the limits of applicability of the most frequently used semi-empirical formulas were examined, 4. based on physical considerations, a method was developed for the determination of a "correction-factor" to be used in order to find the difference between the evaporation from pans and that from larger water surfaces. *Subject Headings:* **1. Evaporation calculations 2. Evaporation from pans 3. Evaporation from water surfaces.**—*Author's abstract.*

10K–136 551.573:551.481.1(498)

Ujvári, I. and Gistescu, P., **Evaporaţia de pe suprafata lacurilor din R.P.R.** [Evaporation from lake surface in Romania.] *Meteorologia, Hidrologia şi Gospodărirea Apelor*, Bucharest, 3(1):49–55,

1958. 4 figs., 5 tables, 3 refs., 4 eqs. Russian, French and English summaries p. 49. **DWB**—A map of lake surface evaporation in Romania is presented; it is based on data for 1954–1956 computed by the formula of A. P. Braslavskiĭ and Z. A. Vikulina (*see* 7.3–15, March 1956, *MAB*), which accounts for duration of evaporation period, radiation absorption, wind, altitude, topography, etc. Tables of coefficients to be used for these parameters are included. A map of aridity (Evaporation/Precipitation) in Romania is also presented. *Subject Headings:* **1. Evaporation from lake 2. Romania.**—*G.T.*

1959

10K–137 551.573:533:531.5

Bauer, Ernest and Zlotnick, Martin (*both, AVCO Res. and Advanced Dev. Div., Wilmington, Mass.*), **Evaporation into a boundary layer.** *Physics of Fluids*, N. Y., 1(4):355–356, July/Aug. **1958**. foot refs., 13 eqs. Also: **Pt. 2, Dissociation in evaporation.** *Ibid.*, 2(2):236–237, March/April **1959**. 3 refs., 6 eqs. **DWB**—In Pt. I the case of evaporation of a solid or liquid material (BO) under a wide range of conditions such as are encountered in missile re-entry, ignoring chemical reactions, was considered with conclusion that the rate of diffusion was much smaller than the adsorption rate, so that the "ablation process is limited by the rate at which the wall material can diffuse across the boundary layer." In Pt. II the case where a simple chemical reaction occurs is considered, e.g. where the wall material dissociates in evaporation and the elements recombine on the wall only. The equation

$$R_B = \frac{1}{1 - \dfrac{\text{rate of diffusion of } B}{\text{rate of recombination of } B \text{ \& } O \text{ on the wall}}}$$

is presented for the simple case where evaporation, not diffusion, limits the amount of material ablated. *Subject Headings:* **1. Aerothermochemical reactions 2. Evaporation into a boundary layer 3. Missile re-entry problems.**—*M.R.*

10K–138 551.573:551.481.1(794)

Lamoreux, W. W. (*Hydrologic Services Division*), **Salton Sea evaporation study.** Wash., D. C., U. S. Weather Bureau, [manuscript,] Jan. **1959.** 19 p. 8 figs., 8 tables, 22 refs., eqs. Mimeo. **DWB**—Water budget data, obtained in the 1909–1910 Salton Sea campaign and reported previously in several preliminary reports, but no final report, have been reconsidered. Evaporation values as computed by different methods are presented; they range from 70.31 to 89.23 inches per year. Analogy with the more precise Lake Mead values would indicate that Salton Sea evaporation should definitely be more than 80 inches per year. *Subject Headings:* **1. Evaporation from lakes 2. Salton Sea, California.**—*G.T.*

10K–139 551.573(76)

*Long, Arthur R. (*comp.*), (*State climatologist*), **Evaporation [in] Alabama.** U. S. Weather Bureau, (**1959**). 9 p. tables. **DWB** (M73 U587ev)—Monthly evaporation amounts are tabulated for 10 stations in Alabama for periods of varying length through 1958. The tables represent all data available for that state (earliest record began in 1908, longest 1934–1958). Short discussion of the results, and of evaporation measurement in general, is included. *Subject Headings:* **1. Evaporation data 2. Alabama.**—*G.T.*

10K–140 551.573:551.5

Mysels, Karol J. (*Univ. of Southern Calif., L. A.*), **Direct observation of evaporation from quiescent water.** *Science*, N. Y., 129(3341):96-97, Jan. 9, **1959.** 5 refs. **DLC**—The color change of a filter paper impregnated with cobaltous chloride and held just above the surface of water gives a good indication of the rate at which evaporation proceeds from individual regions of the surface. The marked effect of some monolayers on thermal convection currents within the liquid can be thus shown. *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation measurement techniques.**—*Author's abstract.*

10K–141 551.573:532.5

Okuda, Setsuo (*Okayama Univ.*) and Hayami, Shōitirō (*Kyoto Univ.*), **Experiments on evaporation from wavy water surface.** *Records of Oceanographic Works in Japan*, Tokyo, n.s. 5(1):6– Feb. **1959.** 5 figs., table, 5 refs., 5 eqs. **DWB**—A series of experiments was carried out to vestigate the evaporation rate of water from a wavy surface generated by wind, and the effect swell on the evaporation rate. Numerical values of evaporation coefficient and evaporation fac are computed from the experimental results. In strong wind, splashing of spray increases t evaporation rate considerably and the effect of spray upon evaporation is more significant than th

of generation of waves. It seems that the mere existence of swell does not affect the evaporation rate. *Subject Headings:* **1. Evaporation from water surfaces 2. Wave effects on evaporation.**—*Authors' abstract.*

10K–142 551.573:551.579.5

Schleusener, Richard A. and Corey, A. T. (*both, Civil Eng., Fort Collins, Colo.*), **The role of hysteresis in reducing evaporation from soils in contact with a water table.** *Journal of Geophysical Research*, Wash., D. C., 64(4):469–475, April **1959.** 7 figs., 6 refs., 15 eqs. **DLC**—Evaporation studies were conducted on three soil types in contact with a water table. For conditions of high evaporativity or increased depth to the water table, it was found that evaporation from the soils was not always in proportion to the rate of evaporation from a free water surface. Under some conditions there was an inverse relation between evaporation from the soils and that from the free water surface. Analysis of upward movement of water from a water table in the absence of hysteresis effects does not provide a satisfactory explanation for this inverse relation. A capillary tube model is used to explain qualitatively these results on the basis of reversals of changes in pressure in the soil water. This hysteresis phenomenon is believed to be responsible for reducing evaporation from soils in contact with a water table. *Subject Headings:* **1. Evaporation from soil 2. Soil moisture movement.**—*Authors' abstract.*

10K–143 551.573:551.556:551.465

Volkov, P. A., **O mekhanicheskom isparenii s vodnoĭ poverkhnosti.** [Mechanical evaporation from a water surface.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:37–39, March **1959.** 2 figs., 3 refs. **DWB, DLC**—Mechanical evaporation is defined as the excess over the natural evaporation resulting from the action of waves and wind (entrainment of spray from the crest of waves, increase of the evaporating surface due to foam and bubble formation and effects of the variation of the position of the evaporating surface in relation to the wind). The author describes his experiments aimed at determining quantitatively the magnitude of mechanical evaporation due to foam formation. The experiments were conducted on Artema Island in the Caspian Sea, at the Caspian Scientific Research Station of the Academy of Sciences of the U.S.S.R. Evaporation was measured in four evaporation pans, three of which were equipped with apparatus producing foam at different rates. Three curves are presented, showing evaporation as a function of foaming rate in fresh water and in salt water of two different salinities. *Subject Headings:* **1. Evaporation from water surfaces 2. Wave effects on evaporation 3. Wind effects on evaporation 4. Foam.**—*G.T.*

10K–144 551.573:551.578.4

Williams, Gaynor Parry, **Evaporation from snow covers in eastern Canada.** *National Research Council of Canada. Div. of Building Research, Research Paper*, No. 73, **1959.** 10 p. graphs, tables, 22 refs. **DLC** (QC915.W65). Also issued in *Eastern Snow Conference, Proceedings*, Vol. 5:18–20, **1958.**—Foreign literature and experiments on snow evaporation are reviewed, and field studies conducted at Ottawa during the cold months of 1956–57 are described. Snow evaporation was measured by sinking pans of snow flush with the snow surface and weighing the pans periodically. The change in weight was taken as a measure of evaporation or condensation. The evaporation rate was calculated from appropriate meteorological data using an empirical equation developed from the Sverdrup equation by assuming constant surface roughness and air pressure. The order of magnitude of evaporation rates during the melting period was estimated using the same equation. Data are tabulated and graphed on the observed evaporation, parameters used to calculate evaporation rates, the relationship between calculated and measured evaporation rates, and calculated evaporation rates. The effectiveness of present techniques and calculations for determining snow evaporation is evaluated. *Subject Headings:* **1. Evaporation of snow 2. Eastern Canada.**—*SIPRE abstract 17196.*

SUPPLEMENTARY MATERIAL

10K–145 551.573(73)

Kohler, M. A.; Nordenson, T. J. and Baker, D. R., **Evaporation maps for the United States.** *U. S. Weather Bureau, Technical Paper*, No. 37, **1959.** 13 p. 6 figs., table, 5 maps (fold.), 12 refs. **DWB**—The following series of maps is presented for the United States (except Alaska and Hawaii): 1. average annual class A pan evaporation, 2. average annual lake evaporation, 3. average annual class A pan coefficient, 4. average May–October evaporation in percent of annual and 5. standard deviation of annual class A pan evaporation. The methods used in computing the data are discussed in detail and the nomograms constructed for the purpose are presented. The maps represent the 10-year period 1946–1955. *Subject Headings:* **1. Evaporation maps, U. S. 2. United States.**—*G.T.*

10K–146 551.573(47)

Ivanov, N. N., **Karta ispariaemosti v ravninnoĭ chasti SSSR.** [Potential evaporation map for the plains region of the U.S.S.R.] *Leningrad. Universitet, Uchenye Zapiski*, No. 269:160–166, **1959.** map, 7 refs. **DLC**—In computing potential evaporation the effect of the water reservoir (or oasis), with which one begins, is not only proportional to its size but to the aridity of the climate. A suitable potential evaporation formula proposed by the author is $E_M = 0.0018\ (25+T)^2(100-a)$, where E_M = monthly amount of potential evaporation (in mm); T = mean monthly air temperature; a = mean monthly relative humidity (in %) for 24 hrs. Under desert conditions this formula yields results that exceed those of BRASLAVSKIĬ and VIKULINA by 10–38% since these authors made their computations for reservoirs having a width of 10 km. A map of the annual potential evaporation of the lowland portion of the U.S.S.R. computed by the author's above formula is presented and is analyzed. It contains 21 isolines ranging from 300 mm to 2200 mm, based upon 1200 points. In the Russian plains potential evaporation increases from north to south extremely smoothly, at first gradually then more rapidly. The increase was particularly gradual between 55–57°N lat., amounting to only 120–130 mm. The moderating influence of large water reservoirs as a result of lower summer temperatures and increased relative humidity is very marked. This is perceptible in the regions of Lake Ladoga and Lake Onega, and near the Black and Caspian Seas. About 100–120 km from the shores of the Black Sea potential evaporation begins to decrease and along its shores it falls to 120–180 mm in comparison with a ridge along the line Kishinev-Zaporozhe-Shakhty. The isolines are compressed somewhat to the east and widened to the west on the Russian plain. Central Asia has a markedly increased potential evaporation as compared with the Russian plain and Siberia has a value from 600–700 mm in the north to 2200 mm in the central Kara Kum, etc. *Subject Headings:* **1. Evaporation charts 2. Potential evaporation 3. U.S.S.R.**—*I.L.D.*

10K–147 551.573(43)

*Grunow, Johannes and Leistner, Walter, **Registrierungen der Verdunstungsgrösse in Wyk/Föhr und in Hohenpeissenberg.** [Evaporation records for Wyk/Föhr and Hohenpeissenberg.] *Germany, Deutscher Wetterdienst, Berichte*, 7(49), **1958.** 24 p. 15 figs., 13 tables, 22 refs. German and English summaries p. 3. **DWB, DLC**—Results of records of several years with the Leistner evaporimeter, made at Wyk on the coast of the North Sea and at Hohenpeissenberg in the foothills of the Alps are discussed. The characteristic of the Leistner-ball is compared with the work of other evaporimeters, e.g., Piche-disc, Vilkner-ball. Considering all factors acting on evaporation, more than half of the water loss in summer months is caused by radiation. This share can be represented either by global radiation or by duration of sunshine. The representation of the humidity situation can be made as well with relative humidity as with saturation deficit ($E-e$). Concerning the influence of wind, a velocity of 5 m/sec cannot increase evaporation essentially. Diurnal variation of evaporation and the shares of the single times of day are discussed. In annual variation a parallelism is made to the duration of sunshine. Cases of extremely high diurnal sums of evaporation are connected with some typical weather situations with descending air masses. The step values of diurnal sums in the climate of the North Sea disperse more than in Hohenpeissenberg. In the climate of the foothills of the Alps the evaporation in summer is lower, in periods of transition higher than in coastal climate. In comparing the annual variation of evaporation with other elements acting on it, the best agreement is found with relative humidity and duration of sunshine. *Subject Headings:* **1. Evaporation data 2. Wyk, Germany 3. Hohenpeissenberg, Germany.**—*Author's abstract.*

10K–148 551.573(498)

Bădescu, Victoria, **Relaţii între evaporaţie şi factorii hidrometeorologicí locali determinaţi pentru lacul Căldăruşani.** [Relations between evaporation and local hydrometeorological factors as determined for Lake Căldăruşani.] *Meteorologia şi Hidrologia*, Bucharest, 2(2):8–21, April/June **1957.** 15 figs., 13 eqs. **DWB**—On the basis of evaporation measurements made twice daily in 1954–1956 by means of a floating 3000 cm² GGI (Soviet) evaporimeter, and three daily observations of meteorological elements, relations between mean daily and monthly values of evaporation from Lake Căldăruşani and atmospheric temperature, vapor pressure, wind velocity, water temperature and saturation deficit are presented in the form of scatter diagrams. Relations between atmospheric temperature and water temperature are also analyzed. *Subject Headings:* **1. Evaporation from lakes 2. Lake Căldăruşani, Romania.**—*G.T.*

10K–149 551.573:551.51

Laĭkhtman, D. L., **Opredelenie summarnogo isparenііa i teplootdachi s nebol'shikh vodoemov.** [Determination of total evaporation and heat loss from small reservoirs.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 53(115):36–43, **1955.** 3 figs., 5 refs., 34 eqs. **DLC**—The problem of the rate of evaporation into moving air from a body of water having the form of a quadrant is analyzed. The influence of various factors on evaporation rate is explained, namely: 1) speed

air mass displacement and 2) rates of turbulent exchange in the vertical, in the direction of air movement and perpendicular to it. Mathematical expressions are derived for absolute humidity and evaporation rate. By means of the expression obtained, evaporation rate can be calculated for different distances from the windward side of the basin, and the influence of longitudinal diffusion can be evaluated. Calculation of this latter parameter is essential in the first several meters. It is shown that lateral exchange may be disregarded if the area of the water is considerably larger than the portion where lateral exchange occurs. The author further examines evaporation from water surfaces where both longitudinal and lateral exchange are negligible. A simple example is given for calculating evaporation rate and total evaporation for a given period of time, and evaporation from the whole water area for that period. A template is presented which simplifies all computations involved. *Subject Headings:* **1. Evaporation from reservoirs 2. Heat balance over lakes 3. Temperature-humidity over reservoirs.**—*Referativnyĭ Zhurnal, Fizika,* 27253, 1956.

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Barnes, H.: **Oceanography and marine biology.** New York, Macmillan Co.; London, George Allen Unwin, 1959. 218 p. figs. Price 35 s, $7.00. Review by Herbert Curl, Jr. in *Ecology* Durham, N. C., 40(4):747–748, Oct. 1959.

Conklin, G.: **The weather-conditioned house.** New York, Reinhold, 1958. 238 p. numerou figs., tables. Price 118 s. Review in *Royal Meteorological Society, Quarterly Journal*, 85(365) 319–320, July 1959. (*See* 10.6–29, June 1959, *MAB*)

Davies, R. D. and Palmer, H. P.: **Radio studies of the universe.** London, Routledge and Kega Paul, 1959. Price 25 s. Review in *Weather*, London, 14(11):370, Nov. 1959.

Fett, Walter: **Der atmosphärische Staub** [Atmospheric dust]. Berlin, Veb Deutscher Verlag de Wissenschaften, 1958. 309 p. figs., tables, numerous refs. Review by F. Steinhauser i *Archiv für Meteorologie, Geophysik and Bioklimatologie, Ser. B*, Vienna, 9(2):306–307, 195 (*See* 10.5–11, May 1959, *MAB*)

Koeppe, C. E. and De Long, G. C.: **Weather and climate.** New York, McGraw-Hill, 1958. 341 p figs., maps, plates, tables. Price 58 s. Review in *Royal Meteorological Society, Quarterl Journal*, 85(365):318–319, July 1959. Review in *Weather*, London, 14(10):335, Oct. 195 Review by A. V. Vandenplas in *Ciel et Terre*, 75(5/6):230, June 1959. (*See* 10.7–4, July 195 *MAB*)

Meteorology of the Antarctic, ed. by M. P. van Rooy. Pretoria, South Africa, Weather Burea 1957. 240 p. figs., tables, maps. Review by H. H. Lamb in the *Geographical Journa* 144(2):256–257, June 1958. Review in *La Météorologie*, No. 49:75–76, Jan./March 195 Review by M. Rodewald in *Annalen der Meteorologie*, Hamburg, 8(9/10):314–316, 1959. (*S* 9.9–1, Sept. 1958, *MAB*)

Muromtsev, Alekseĭ Mikhaĭlovich: **Osnovnye cherty gidrologii Tikhogo okeana** [Basic features the hydrology of the Pacific Ocean]. Leningrad, Gidrometeoizdat, 1958. 629 p. figs numerous tables, refs. Review by S. D. Osokin in *Priroda*, Moscow, No. 8:119–121, Au 1959. (*See* 10.7–29, July 1959, *MAB*)

Stommel, Henry: **The Gulf Stream: a physical and dynamical description.** Berkeley and L Angeles, University of California Press, 1958. 202 p. Price $6.00. Review by R. B. Mon gomery in *American Geophysical Union, Transactions*, 40(3):225, Sept. 1959. (*See* 10.8–1 Aug. 1959, *MAB*)

Tunnell, G. A.: **World distribution of atmospheric water vapour pressure.** *Great Britain. M teorological Office, Geophysical Memoirs*, No. 100 (Vol. 12, No. 8), 1958. 61 p. Price 10 Review in *Weather*, London, 14(11):370, Nov. 1959. (*See* 10.8–13, Aug. 1959, *MAB*)

Willett, H. C. and Sanders, F.: **Descriptive meteorology.** 2nd ed. London, Academic Press, 19 355 p. figs. Price $7.50. Review in *Royal Meteorological Society, Quarterly Journal*, 85(36 318, July 1959. (*See* 10.7–217, July 1959, *MAB*)

B. TRANSLATIONS AND RECENT MONOGRAPHS

Translations

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